

PROCEEDINGS
OF THE
ELEVENTH NATIONAL CONFERENCE
ON CITY PLANNING

NIAGARA FALLS AND BUFFALO, N. Y.

MAY 26-28, 1919

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San Francisco, California
2006

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PLANNING RESIDENTIAL SUBDIVISIONS

PRESIDENT'S ADDRESS

FREDERICK L. OLMSTED

Brookline, Mass.

The City Planning Conference of 1917 urged the application of city planning methods and principles in dealing with:

1. CANTONMENTS.
2. CONCENTRATIONS OF WORKERS IN WAR INDUSTRIES.

The first was done without great delay and with results that were creditable considering the extraordinary pressure of haste. These were discussed at the last conference.

The second was greatly delayed and was done from the very nature of the case in a fragmentary, halting and uneven way, under many disadvantages beside those of haste.

Let us first consider briefly what has been contributed to the national welfare during the crisis of the war by the existence of the city planning point of view, that of considering the entire physical environment and equipment of a community—whatever the origin, ownership or administrative control of its manifold parts—as constituting a single complex tool for the service of the community, and of endeavoring to shape the development of this tool in the interest of the whole community it serves.

Then let us consider what the experience of these two crowded and confused and struggling years has contributed toward the more effective application of the city planning point of view in the future, with some special reference to the planning of the residential neighborhoods which constitute the great bulk of all urban communities.

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Among the points on which the experience of war-time town planning should be illuminating in connection with future work may be mentioned:

I. The town planning coöperation of men of diverse expert training in cantonments and industrial housing neighborhoods.

II. The accumulation of a comparable body of facts in regard to the selection, the acquirement and the design both in general layout and in all details from sewers to telephone lines and from the street pavement to the kitchen stove and bedroom wall-paper of a large number of residential neighborhoods, most of them conducted under only two central controlling agencies; all of them aimed at supplying dwellings of the size most in demand throughout the United States and occurring under a great variety of local conditions; also facts in regard to the complete construction of many of these projects; and the certainty of facts in the near future as to the operation, rental and sale of the resulting properties.

III. Experience bearing on the advantages, and the limitations on the advantages, of completely centralized control of the planning of towns and residential neighborhoods.

In regard to the accumulation of comparable data concerning the industrial housing projects of the United States Housing Corporation and the Housing Department of the United States Shipping Board, with the former of which your President has been connected from the start and with the latter of which many members of the Institute have been associated, it was hoped that before the disbandment of these remarkable organizations it might be possible for representative experts in the several lines of the work who had been together through the experience of handling these diverse projects, to collate, analyze and discuss the results of their unique experience in a really thorough manner. This hope has proven in large part illusory because of the fact that the organizations were authorized and created by the Government strictly to meet

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a war emergency and not to study the subject of housing and town planning for the future peace-time benefit of the country, and because of the fact that all hands felt the need of ending their emergency service to the Government as soon as possible after the emergency was past, in order to take a well-earned rest and to attend to their neglected personal affairs. The Shipping Board's Housing Organization has prepared a report for publication and the Housing Corporation has a report in press. The latter will embody many facts about the housing projects, which will, I believe, yield large fruits to careful study and analysis by those inclined to such study, especially those who have had some personal contact with the operations themselves. But on account of the limited time available, the rapid scattering of the technical staff and the exhausted brain condition of those who remained, the discussion of the facts and conclusions in the case of the report of the Housing Corporation at least, is very far from what I had hoped it might be made.

Returning now to the advantages, and limitations on the advantages of completely centralizing control of planning of a town or a residential neighborhood:

The great advantage is the removal, at least in theory, of obstacles to efficient comprehensive interlocked planning; by having all the different kinds of planners working for one boss who urgently requests coöperation, by entire removal of conflicting selfish proprietary or speculative interests as an influence on the plans, by having a single head for adjusting honest difference of opinion so that in theory the necessary adjustments and compromises of a complex job of planning can be made with intelligent consistency.

These advantages are very real, but in practice they are bound to fall short of their theoretical effect because of certain very human limitations. A number of men, who must, in order to cover the field, be of diverse training and points of view, may be working devotedly in the in-

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terest of one and the same boss and may be told to co-operate, may desire to coöperate, and yet fall a long way short of complete and effective coöperation; because it may take more patience and considerateness and personal humbleness of spirit to bring about such coöperation than most of us possess, or because there is so little understanding of each other's point of view that mere good will cannot bridge the gap in the time available, or merely because of the mental laziness which leads one man rather to accept conditions arising in another man's field as fixed handicaps and to proceed in his own field as best he can with those handicaps than to arrive at real joint conclusions by a combined mental operation which envisages both fields.

Whatever may be the case in simple problems, in complex problems I am more and more impressed with the fact that conflicting interests and essentially hostile motives are much less the cause of failure to unite on the best plans than is generally supposed, and that sheer mental inability to get together, or a lack of mental and moral energy to make the necessary effort, is much more often the limiting factor than is generally supposed.

In the technical field of planning residential subdivisions in a comprehensive way, there is involved the coördinated work of men of diverse expert training relating especially to the following groups:

- (a) The design and construction of engineering utilities with due regard to operators' problems, contractual relations and the business and financial aspects of each utility:

- Water supply

- Gas and electric services and street lighting

- Sewerage and storm drainage

- Street construction and maintenance

- Passenger transportation, etc.

- (b) The design and construction of surface improvements considered primarily from the point of view of general convenience and attractiveness of ap-

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pearance, and the influence on real estate values, also with due regard to maintenance problems, and the bearing of the burden of cost.

General design of streets, blocks and lots.

Visible details of surface constructions and of above ground utilities. Parks, playgrounds and kindred recreation facilities.

Lot improvements external to buildings.

- (c) The design and construction of buildings with all the technical subdivisions of that field of design and construction, again with due regard to cost and value.
- (d) The general business of watching values as reflected in price and rentals of real estate variously improved and of operating problems.

No man can cover all parts of that field well and thoroughly. There must be collaboration of somewhat specialized experts, but for the most effective collaborations each one must be enough of a city planner to understand and respect the special points of view and problems of the others and to recognize his own limitations. The one who has the best general grip on all aspects of the complex subject and the best executive head will be the natural and the best leader in the coöperation irrespective of what his own specialty may be.

In the work of the Housing Corporation teams of such collaborators were thrown together and on the whole worked admirably, the fine spirit of devotion to the work making up for some lack of previous practice in such hearty coöperation. There were two chief weaknesses which appeared in these coöperative efforts. The first was the natural tendency to departmentalize the work and reduce it to a sequence as in ordinary practice, instead of a coöperation, as, for example, having one man lay out the streets, lots and house sites, letting the utilities engineer stand by until this is done and then fit his work to the plan as it stands, and having the architect go off by himself to

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plan the houses to be built on the resulting lots. The other was having one man assume that he knew the whole show, and try to do the real head work of the others for them and use them as mere tools and subordinates.

There is not an engineer, not a landscape architect, not an architect, not a real estate man among the whole bunch who knows enough about the work of the others to do the latter successfully, nor can the work be successfully departmentalized and standardized so as to pass it in succession from one to another like a factory job passing from one process to the next. The gains from real co-operation in design were conspicuous and the losses from its partial failure by either of the causes cited above were obvious.

"Passing the buck" is a conspicuous habit in governmental affairs and especially in army affairs; but it is by no means confined to those quarters. It flourishes in every large organization; more or less in proportion to its size, complexity and centralization of authority. And when a central authority of any sort gets swamped with a combination of large questions and petty detail the chances are that the detail will absorb most of the available ability and energy.

If there is any lesson from all this specially applicable to city planning, it is that in proportion to the comprehensiveness of the field of city planning for which any agency is responsible it should concentrate on those aspects of the entire field which cannot possibly be met by a less comprehensive agency, and either delegate or refuse to assume those aspects which can be dealt with after a fashion by less comprehensive agencies.

Let me be more specific. A city planning agency whose field covers a whole city ought to concern itself, in respect to streets, sewerage, drainage, water supply, and transportation, with the location and proper capacity of the trunk lines of these several services in relation to each other and to the permanent interests of the whole com-

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munity, and with questions of source and destination, especially in water supply and sewage disposal; leaving the details of local streets, service mains and branches for some one else to worry out, so that there shall be the least possible hampering of individual initiative on the part of neighborhood units, of real estate developers and of special departments of the city administration or private utility companies in developing their individual plans so far as is consistent with providing for the few big things that can *only* be done by united central action. It is not that the ways in which these other local or special services are supplied do not affect the interests of the entire city. They do. Bad local streets all over the city make the whole city in so far bad. Badly planned local service mains all over the city mean a general fire risk or a needless burden of cost or other drawbacks which affect the city as a whole.

But if, because the city as a whole is affected by the way in which all of these details and a million more are decided, the responsibility for planning all of them is thrown back upon any single centralized planning agency, its human limitations will surely cause it to fail except in so far as it delegates and decentralizes most of the work and manages to make it stay decentralized.

The way in which comprehensive city planning can best make progress is by not biting off more than it can chew; especially by concentrating on the things about which the advantages of centralized and interrelated control of planning are indisputably greater than the disadvantages.

These things differ enormously in respect to the size and character of the territorial unit under consideration. In the case of a residential neighborhood small enough to be fairly homogeneous, a planning agency comprehensive in its scope as to that particular neighborhood and not burdened with similar responsibility for each of the other neighborhoods in the city or for the larger problems which are insoluble except by joint action on behalf of many neighborhoods, can properly and effectively carry

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its centralized planning much further into detail than is at all wise or practicable for a planning agency whose field is the whole city. The residential neighborhoods planned under the direction of the United States Housing Corporation have generally been of this small homogeneous sort, like many other industrial housing developments and innumerable less completely planned residential subdivisions of land companies and realtors.

In one sense city planning embraces the whole thing down to the determination of the plumbing fixtures in the houses and the flowers in the yards, and there is not a detail in any branch of the subject which does not have a technical interest for some member of this Conference. But this vague inclusiveness does not indicate the meaning of city planning in the practical sense which alone justifies the existence of this Conference in addition to the capable specialized organizations in such fields as municipal engineering, water supply, sewerage, transportation, architecture, housing, real estate, landscape architecture, and so on. In this practical sense city planning stands for a focussing of attention upon certain particular aspects of the multitudinous plannings by which the physical condition of an urban area is shaped, namely, upon those aspects *wherein there is prospect of securing really substantial advantages* for the community by controlling the work from the city planning view point rather than that of the purveyor of a special commodity or service, or that of an individual locality within the area. You will remember that I spoke of the city planning view point as that of considering the entire physical environment and equipment of a community, perhaps I might say the entire physical contents of an urban area—regardless of the origin, ownership or administrative control of its manifold parts—as constituting a single complex tool for the service of the community, and of endeavoring to shape the development of this tool as a unit in the interest of the community it serves.

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The purveyor of water, gas or electricity, the specialist in one of those utilities, can make probably a better job and certainly a quicker and more efficient job of planning the supply and distribution of his own utility, considered in itself, if he is given a free hand, than can be done by any humanly possible comprehensive and centralized city planning agency, with which that particular utility is but a fraction of its responsibilities. The same is true of the specialized professional or commercial purveyors of houses, of parks, of almost any urban commodity; and it is emphatically true that individual citizens and owners of real estate are on the average and in the long run safer judges of the interests of their own localities than any central authority can be. The justification for comprehensive city planning is simply that there are *some* aspects of almost all specialized or localized planning where control of the specialist or localist planner by application of the comprehensive city planning point of view is apt to save so much more through avoidance of physical interference and duplication of waste of effort in actual construction and maintenance, than it loses through extra administrative machinery and loss of time and duplication and waste of effort in planning, as to be well worth its cost.

Recognizing, then, that the first problem of city planning in the limited practical sense is to mind its own business, to concentrate on the problems where its value is most certain, to avoid those where its advantages are apt to be purchases at too high a cost, in circumlocution and wasted effort, let us consider the more important city planning functions in connection with a *residential neighborhood unit*, first of the city planning agency of the *municipal corporation* whose field is the entire city, and second of a proper local planning agency exclusively for the neighborhood. The latter most often represents the landowner, such as a development company, the United States Housing Corporation offering a good example; but sometimes represents a syndicate or coöperative group

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of landowners; and might represent a subordinate municipal unit with certain powers delegated by the State.

First as to thoroughfares:

So far as I can recall in all the operations of the United States Housing Corporation it was only in Philadelphia that the municipal authorities had a plan of streets not yet dedicated or otherwise acquired, in which there was a clear and conspicuous distinction between those which the city regarded as necessary for traffic between points lying outside of our development and those which were strictly local. The Corporation was required to adhere to the former on pain of receiving no coöperation from the city in respect to sewerage and water supply but was permitted to rearrange the latter very much to suit itself. Without here stopping to discuss the advantages and disadvantages of the particular plan of through streets on which the Philadelphia authorities insisted or of the intermediate local street plan which the Corporation substituted for the conventional Philadelphia plan, I want to impress upon you the soundness of the principle which they followed, and the deplorable absence of that principle in most cities. Generally the Corporation found no streets planned except those actually dedicated to public use, and among streets dedicated or even open and more or less completely improved, no clear recognition of those which were needed as thoroughfares more than local use. Through the power of requisition entrusted to the Secretary of Labor the Corporation was enabled, where necessary, to acquire the fee of dedicated streets, to close them and to lay out new street plans; and it availed itself of this power in a good many cases. In doing so it took special pains to provide what it believed to be suitable through lines of traffic important for the city as a whole, but in so doing it was performing a function which no city ought to leave so completely in the hands of local proprietary interests as most cities do. On the other hand, in many cases, the platted streets which had been dedicated long in advance of actual

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improvement and installation of utilities, mainly or entirely as a device to facilitate speculative transactions in lots, were found to be laid out so totally without regard to any distinction between thoroughfares and supplementary local streets that the Corporation was forced to accept an uninteresting, unattractive and often a somewhat extravagant plan of local subdivision, because any street changes within the limited area which it controlled would interrupt lines that might become important as thoroughfares.

SEWERAGE AND STORM DRAINAGE

Again as to sewerage and storm drainage the usual experience of the Housing Corporation was that in undeveloped or partially developed areas the cities had no plans for the new trunk lines required to serve the lands of the Corporation in common with other lands, although generally willing to coöperate in the construction of them when plans were prepared by the Corporation. These the city ought to have had ready in advance at least in tentative form for its own protection. A somewhat extreme case was in Portsmouth, Virginia, where a tract near the edge of the city's growth previously platted, partially sold off in lots, and in part provided with sidewalks and water was acquired by the Housing Corporation. This tract could be sewered only by constructing a wholly new outfall several inches to tide water at the expense of this one small development. The intermediate territory had sewers of capacity sufficient only for the population now being served, the city having no plans whatever for taking care of sewage from its outlying portions, and no machinery being in existence for securing relief by joint action within any reasonable time. The cost would have been far too great and the only feasible solution was the use of leading cesspools under very unfavorable conditions as to soil and ground water.

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On the other hand there were some instances where a city was up on its toes and had its sewer system planned well ahead of the actual physical extension of urban development, and where there were extreme and arbitrary requirements as to the design and capacity of the lateral branches of sewers, and especially of storm drains in strictly local streets, which placed upon the housing project a needless burden of initial development cost which could only be met by curtailing something else which would be worth more to the occupants than the more permanently ample and satisfactory sewerage and storm drainage.

Case after case of the city authorities not planning ahead as to the things which concern areas so large that only the city authorities can reasonably be expected to plan them: occasional cases of city authorities tying the hands of local initiative by elaborate and arbitrary regulation of details which are primarily of local and not of individual concern.

I know much of this is an old story to most of the members of this Conference, and you may think it a waste of your time to sit there and listen to it again, but my experience in supervising the planning of Government housing projects in nearly a hundred places scattered over the country has deeply impressed upon me the necessity in our cities for hammering away on a few plain, well established elementary principles and on their simplest and most obvious applications, until that much at least is as firmly established in the practice of American municipalities as the habit of having a fire department and a police department. The elementary applications are so clear to us that we naturally and properly want to go on to the discussion of the much less obvious and tremendously important questions of how to apply these principles in detail under widely varying circumstances, and of how similar principles may be extended profitably, in less obvious ways.

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We have always recognized that we had a twofold function to perform: on the one hand self-education and advancement of the "state of the art"; and on the other hand, propaganda, getting city planning into practice. On both sides our progress has been disappointing, partly because we have not sufficiently separated the two lines of effort. But I am strongly impressed with the feeling that we could accomplish much more valuable results in the line of propaganda by concentrating first on such undebatable rudiments as the systematic advance planning of thoroughfares and main drainage systems, both storm and sanitary, with the selection of school and playground and park sites, and with districting, in the near background, and by hammering away on the economic need for every city to maintain in its service an engineering staff suitable in size and organization to keep well ahead of the game in at least these elementary rudiments of comprehensive planning. May I here parenthetically suggest that "suitable in organization" means, among other things, that part of the organization, if that part be only one man, shall be assigned exclusively to planning future undertakings, not yet authorized or decided on, and may under no circumstances be devoted to current or routine work even if the appropriation for routine work is exhausted. Otherwise, planning for the more distant future goes to the wall.

I am not saying that the available sort of assistant in the average city engineer's office is likely to do a very inspired quality of all-round city planning, but he can make a very useful beginning of city planning where it is perhaps most urgently needed, and where it can get a chance to win its way by results. With aid from this organization and from other sources such work can be the means of educating those directly engaged in it, and gradually the other city officials with whom they come in contact, in a broader and larger conception of city planning. If consultants of wider experience are plainly

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needed they will be called in from time to time, and when they are called in they will work with and through a permanent organization that has the basic city planning viewpoint, instead of making a report *in vacuo* and listening in vain for an echo.

But to return to the subject of residential subdivisions and the city's special functions in regard to their planning: School sites, playgrounds and local parks and the subject of districting, occupy a curious position on both sides of the border between the planning functions of the city at large and those of the local planning interest. Where a residential neighborhood is constructively planned by a land company or other local agency on a sufficient scale, it is clearly a matter of enlightened self-interest to plan for a suitable school and playground site, for a school is a necessity of a successful residential neighborhood, and the territory tributary to a single school is the normal neighborhood unit under ideal conditions. Even where the unit of subdivision is considerably less than a school unit, the importance of having a school and playground well located in respect to the subdivision is a matter of keen interest to a clear-thinking planner of a subdivision, and will lead him to take the initiative in negotiations with the school authorities looking towards its establishment. It has been fully established that a well located school and playground, or even a site for the same, definitely fixed and known to be embraced in the program of the school authorities, adds to the value of all the remaining land in the territory to be served by the school more than the value of the land withdrawn for the purpose, just as a local park of suitable size, location and character, and of which the proper public maintenance is reasonably assured, adds more to the value of the remaining land in the residential area which it serves than the value of the land withdrawn to create it. Enlightened realtors who are engaged in the legitimate business of producing and selling what the ultimate consumer wants, for the best price

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that a satisfactory article will bring, know these things, and act accordingly when circumstances are favorable. The speculative subdivider who seeks his profit in selling to suckers, themselves largely speculators on a small scale, like Wall Street lambs, or who relies for his profit more on abstract skill in salesmanship than on the inherent value of what he offers, generally does not.

But even the thoroughly legitimate and thoroughly enlightened realtor whose subdivision is considerably less than will support a school and playground, or a local park, cannot afford to contribute land for the whole thing largely for the benefit of other subdivisions. He can perhaps afford to do somewhat more than his share but not much more. He is always tempted to take a chance on the optimism of the buyer of lots, who expects that the necessities of a residential neighborhood will be supplied somehow by somebody, and let the school authorities come along and do the best they can by purchase, when the time comes that they must meet the demand for a school. Such a subdivider will meet the school authorities at least half-way in providing school and playground lands well located and suitable in size, shape and character if they will go their half of the way at the time the subdivision is planned instead of standing off until the favorable opportunity is gone. I may say incidentally, that this was precisely the usual attitude of the United States Housing Corporation in its subdivisions.

We sought out the public school authorities and earnestly tried to arrive at an agreement with them as to the best school sites, except in those cases where existing schools would serve, and having agreed on the sites we avoided any development which would prejudice their use for school purposes and tried to reach an equitable agreement with the school authorities for taking them and developing them, stretching a point if necessary to get the best practical results.

For these reasons, and because the initiative in such

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matters cannot be expected to come from the smaller subdividers or from all the larger ones, and still more because the economical relation of one school site to another turns on matters which interlock over districts much larger than any single residential neighborhood, it is a matter of serious consequence that the school authorities and the park authorities of a city in coöperation with the other central planning agencies should also plan well ahead in the matter of distributing schools and playgrounds and local park sites, at least in a tentative and flexible way, and instead of waiting for enlightened subdividers to hunt them up and offer them a chance, should be on the spot as soon as a subdivider shows the preliminary symptoms of an outbreak, and work out a mutually satisfactory solution, using the assessment principle if necessary for distributing any part of the burden of site cost which cannot be equitably covered between the subdivider and the general funds.

And now we come to the planning of purely local streets and the lots which front on them. I have said again and again, and certainly everything I have seen in the operations of the United States Housing Corporation confirms it, that much is to be gained and little lost by the city's leaving the greatest latitude of choice to the individual subdivider in the matter of local streets and lotting, by postponing the detailed planning of such streets until the use of the land for dwellings is so close at hand that the desires of the actual user can be estimated with some precision, and acting as a guide and helper to the subdivider who is in the business of producing commercially something that he expects his customers to buy because it suits them, instead of dictating to him in a high-handed way because they have some fixed theory of what a proper subdivision ought to be like. Mind you, I always except an occasional local street, which ought to be fixed in a particular place or at a particular grade in order to provide an economical location for a sewer or storm drain or other public utility trunk line which does not influence the in-

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dividual subdivider, and I except some compulsion in regard to keeping unbroken a site specially desirable for a school or playground or other feature of importance to the neighborhood or the city, provided the city planning authorities are fore-handed enough to know the real needs. Moreover, there are certain things to be avoided unless there are the strongest special and local reasons for them, such as dead end streets, unbroken blocks very much more than six hundred feet in length, needlessly excessive grades, and arrangements likely to result in houses having inadequate light, air or means of access. But when all such exceptions are made the principle stands of giving the individual subdivider the maximum liberty of discretion and acting as live advisor and helper rather than as an obstructionist or a keeper who would put him in a strait-jacket. This applies completely to strictly local streets not at all required for any purpose except access to lots which front on them, and it applies with qualifications to very secondary connecting streets which may be feeders of important thoroughfares.

If I had ever thought that the illuminating and profitable studies of the committee of this Institute on block and lot size would result in a definite ideal standard even of lot depths for residential subdivisions — which I never did, though I think they can result in some very valuable *don'ts* — I should have been cured of that fallacy by what I have seen of the variety and the usability and salability of lots actually in use all over the country, and by what I have heard from the investigators, the town planners and the real estate experts of the Housing Corporation concerning local preferences and antipathies and the supposed reasons for them. There is no one way, there are no half-dozen ways, so much better than others that a city planner can afford to canonize them, or say with certainty that no other arrangement is in the same class. Liberty of choice and individual initiative and ingenuity with the penalty of losing money if a relatively unsalable result

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is produced will in the long run give better average results and certainly a more varied and interesting city than plans imposed from above.

For the individual subdivider of residential neighborhoods, himself, and for the planning agency of the city as his guide and helper, experience suggests a number of points, as suggestions but not as rules. Few of these can here be cited. Besides the few "don'ts" already cited, I would say of local streets on the esthetic side, out of my experience with the Housing Corporation work, that such streets to secure a quality of domestic charm ought not to run in a straight, unbroken vista for more than a few hundred feet at a stretch, where it can be avoided without material loss, that where the street vistas are thus made reasonably short by curves or obtuse angles in the street it is usually desirable that the houses seen in connection with each other on both sides of the bend should seem to be in continuation of each other, and to relate to the continuous line of the street as it makes the bend, rather than that there should be a discontinuity in the houses where the street bends by facing some of them on a cross street or greatly verging the set-back; that the relation between changes in the gradient of a street and the points where curves or angles occur, and also the relation between the grades of the street and any grouping of houses is of far greater importance to the appearance of the result than is generally realized; that slight variations in the set-back of the building line of a street are valuable as adding to its appearance, but that there is the greatest danger of overdoing the amount of the variation. On the practical side, if you will not misunderstand me as implying any conflict between the esthetic and the practical, I might mention, besides the controlling motive of spacing the streets so as to give marketable lot depths and so avoid wastefully acute or tapering corners as far as practicable, the importance of fixing the locations and grades of the streets not only as to minimize the cut and

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fill on the streets and avoid lots needlessly depressed below the streets or even excessively elevated above them, but also to minimize the *total* cut and fill on both streets *and* lots when the latter are developed, so as to give satisfactory and economical sewer profiles, and (especially on flat grades and where combined sewers or storm sewers in front of every lot are not inevitable) so as to carry the storm water in such a way and to such points that the amount of storm sewer construction can be reduced to a minimum without anywhere overloading the gutters. To keep these desiderata all in mind at once, and skillfully to strike a balance of these practical advantages and disadvantages dependent on location and grade while shaping the whole to a result pleasing to the eye, is no joke, but the success with which it is done easily makes a difference of thousands of dollars per mile of street both in cost and in resulting values.

I have not said a word about alleys or about controlling the planning of the houses, which are after all the main part of the final product. The alley discussion and the related matter of easements for pole lines in the interior of blocks I must simply cut out; the more so as I talked a good deal about it at the last Institute meeting. As to control over the design and placing of buildings, from the city planning point of view, as distinguished from that of the investing builder or his designer, it is chiefly exercised by lotting and by restrictions in the deed when exercised by the subdivider, and by their counterpart in the form of district building regulations when exercised by the city.

The subject of lot widths would get us too far into detail for this paper, but I would like to note a minor point in regard to lotting which has struck me forcibly in connection with some of the projects of the Housing Corporation, especially those on a gridiron street plan or nearly so. Where houses of nearly uniform size are to be expected, particularly in detached house developments for people of small means like those we built, where there is a

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moderate and nearly uniform side space between the houses, it is very easy to produce a decidedly unpleasant appearance by laying out lots exactly the same way on both sides of several successive blocks, so that their side lines coincide. It produces very disagreeable lanes or vistas between the houses extending monotonously cross-wise of the blocks, so that it is worth some trouble to stagger the lot lines for the sake of avoiding it.

The subject of residential district restrictions is to have a session to itself later in the Conference so that I will pass it over without remark except for a word about side spaces between houses. The United States Housing Corporation adopted as a general standard a minimum distance of 16 feet between the sides of houses, and in many of its developments the average spacing is made wider than that. In only one case, I think, a development for negroes at Truxtun, in Portsmouth, Va., was a narrower spacing systematically used. There it was, I think, 11 feet, the buildings being detached houses and pairs of semi-detached houses. It was felt when the standards were adopted that where a spacing narrower than 16 feet was forced by economic consideration it was best to reduce the space to nil and use a party wall. I am as sure now as I was then that pairs of semi-detached houses with 16 feet between them are generally better than detached houses with only 8 feet between, barring a strong local or personal prejudice due to fashion. I am equally sure that rows of eight or ten houses with good spaces between the ends of the rows are better than detached houses with two-foot spaces between, like some to be seen in Niagara Falls.

I am not so clear, however, with houses only two rooms deep, like most of those built by the United States Housing Corporation, that 16 feet is the critical minimum width of side space between buildings. My personal impression of Truxtun and of residential communities where a side space of 10 or 11 feet prevails, is that it is very much less desirable than 16 feet, but that it is by no means so un-

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desirable on the score of health or privacy as to justify its prohibition by ordinance. I do think, however, that with houses more than two rooms deep, so that one or more rooms front windows on the side space, a minimum width between buildings of 16 feet is important.

PLANNING PROBLEMS OF INDUSTRIAL CITIES — NIAGARA FALLS AS AN ILLUSTRATION¹

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The modern city is the industrial city. Most of the planning problems and most of the evils of the modern city are due directly or indirectly to manufacturing. A recent writer on social and industrial topics has pointed out how the factory system spread through the world, for it meant wholesale production and wholesale profits to the capitalist. But it did not concern itself directly with mere living. Homes for the new industrial and commercial classes were evolved in muddling, makeshift fashion, under dreadful conditions of congestion. Now, as a result, the shadow of the factory stack falls on ugly rows of houses, and mean tenements, with great sacrifice of human values. The old joy in good handwork died in a new ground, barren of art. Go through the main street of almost any factory town — see the tawdry signs, the perverse decorations, the muddy, discordant paints, the dirty streets. Look into the houses — the ugly furniture, glaring wall papers, poor utensils, pathetic pictures. "We have," said William Morris, "practically killed the beautiful in the nineteenth century. Railroads are ugly. Streets are ugly. Clothes are ugly. Capitalism has plunged us into a mass of ugliness out of which there seems no escape." And this ugliness is not external merely. It strikes in. Inner ugliness, unrest, recklessness, sadden and brutalize human life. Perhaps it is the

¹Lantern slides were shown.

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historic trend. At any rate it is left us only to face the by-product of industrialism, the modern city, and, if possible, improve and civilize it.

In his "American Commonwealth," James Bryce long ago pointed out in his discussion of American political life the conspicuous failure of the American city. In the field of planning we may today point out the conspicuous failure of the American industrial city. Is there a relation between these two facts? If so, which is cause and which effect? Or, is each both cause and effect, reacting unfavorably on the other?

It is possible to make the arraignment of the industrial city a severe one. In arrangement it is inconvenient. In economy it is wasteful. In safety it lacks protection, both of life and property. In health it is guilty of shameful neglect. In social relationship it is one of the main causes of unrest, strikes, etc. In education it fails all along the line. In misery, poverty, and vice it is one of the principal creators and multipliers. In matters affecting amenity or esthetics, it is found ugly and unfit. In a word, it may be said in general that the American industrial city is usually inconvenient, unsanitary, wasteful, ugly, degrading, inefficient.

What, we may ask, do we mean by an industrial city? Not a city that is exclusively industrial—few cities are that—but a city that is primarily industrial, a city whose existence and growth depend mainly upon manufacturing. In this sense Pittsburgh, Bridgeport, Birmingham, Flint, Akron, Niagara Falls, and many other American cities which are now beginning to grapple seriously with their planning problems, are industrial cities.

What, then, are the planning problems of such industrial cities? They are of two broad classes, not mutually exclusive by any means, but they can with advantage be considered separately: those that have to do directly with the economy or efficiency of manufacturing; and those that have to do directly with the contentment and

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welfare of the wage earner, and also indirectly (some would say directly) with the economy and efficiency of manufacturing.

The requirements of manufacturing cities are level land, cheap land, few streets, resulting in large blocks, ample room for expansion; good railroad or water facilities; proper zones; main thoroughfares for hauling with few or no grade crossings; proximity of factory sites to good housing; trolley or motor bus transportation for employees if homes are not within walking distance of industrial plants; location of factories with due consideration to prevailing winds and their effect upon other sections of the city; public utilities, including water, gas, electricity, and sewers; and water or other power.

Equally important are homes for workmen. Consideration must be given to the house itself and its garden; the properly protected residential zone; local streets as distinguished from main streets; recreation areas; schools and part time schools; churches and other social institutions. These are the local factors. Then there should be main streets to the factory, to the low-cost housing districts, and to the downtown district, with its shops, commercial amusements, public institutions of higher life, civic buildings (government buildings, leisure time buildings, such as library, art museum, community building, for social recreation and discussion, etc.). Consideration must be given also to the cost of living in relation to wages — cost of the home itself, other living costs, and local taxes.

Among the city planning features of industrial cities may be mentioned especially main thoroughfares, the problem in regard to which are connections for goods from factory to freight stations, water terminals, etc.; their gradient, width, alignment, and freedom from railroad crossings at street grades; large community parks; high and other special schools; and zoning.

What is the difference in the planning of an industrial city and other cities? It is mainly a difference of *emphasis*

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—emphasis upon those things which have to do with economy and efficiency in manufacturing, and with the contentment and stability of wage earners. There is also the difference in the cost of planning and developing an industrial city; the same difference of relation that the cost of a factory building bears to the cost of a church, public building, or better class residence. That is, the cost of planning in an industrial city is justified or fails of justification according to the economic return.

It would be profitable in considering the planning problem of industrial cities to discuss large *versus* small industrial cities. It is difficult and costly to replan existing large cities. There are advantages in replanning small cities as compared with large ones, but there are even greater advantages in planning, laying out, and developing entirely new industrial towns or cities. They permit deliberate choice of location, based upon a regional survey, the development of an efficient town plan, and the intelligent control and limitation of area and population.

Some of the economic advantages of planning industrial cities in relation to the costs of production are: proximity to raw material; the elimination of the unnecessary cost of hauling and shipping; reduction in the labor turnover; and better living and working conditions both in factories and in homes.

A study of industrial cities discloses the fact that the power, growth, and progress of a city have depended heretofore not so much upon natural resources as upon the initiative of its leaders and the united civic interest of its people.

The challenge to the members of the National Conference on City Planning is, "How many industrial cities can claim a reasonable mastery of their planning problems, even if tested only by the topics here briefly enumerated?" If such cities cannot be named, "What are the reasons?"

As a specific example of the planning problems of an industrial city, the following summary of the work on the

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plan of the city of Niagara Falls is presented with lantern slide illustrations. It is an attempt to disclose the civic conditions resulting from a drifting policy and to put forth definite proposals as an answer to some of the questions which the first part of the paper raises.

The planning problems of the city of Niagara Falls involve its consideration as a resort for tourists, and also as an industrial center. Under any conditions these two phases are more or less in conflict, but if the development of the city is allowed to drift without definite plans as to the extent and character of improvements, the conflict will be increased. The success of Niagara Falls as an international resort depends primarily upon the beauty and interest of the Falls themselves, and their immediate surroundings. Nevertheless, other factors of city development are important, including the attractiveness of the city itself, and the provision for the convenience and comfort of tourists. Visitors are affected favorably or otherwise by the character of streets, hotels, art and souvenir shops, cafés and restaurants, theaters, the number and beauty of parks, recreation areas, and other open spaces, etc. Any survey of Niagara Falls reveals great neglect of the city in this respect. It is at present greatly handicapped in its effort to obtain an orderly and more attractive development of the city by the unfavorable existing conditions, which interfere seriously with its success as a resort, its efficiency and attractiveness as an industrial city, the stability of its property values, and with its growth in population and increase in wealth. The removal of these handicaps involves certain fundamental physical improvements—such, for example, as the relocation of the railroad rights of way and of passenger and freight stations, the elimination of grade crossings, the planning and construction of a more suitable and adequate main thoroughfare system, the selection and proper development of parks and parkways, the question of sites suitable for public buildings, schools, etc., the adoption of an

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ordinance providing for the zoning of the city, and the general improvement of housing conditions.

Niagara Falls holds now, and always will hold, a prominent place as an international resort, yet its interests as an industrial city are of still greater importance. The planning problems of the city, therefore, are now primarily those of an industrial city. An observer familiar with Niagara Falls from frequent visits has recently written that "While it is well known that the business connected with visitors to the scenic wonders of the Falls and Gorge continues to grow and is of immense value to the prosperity of the city, it is also recognized that the growth of the city in population and wealth is, and will increasingly continue to be, due in greater degree to the huge power plants and to the manufacturing industries than to the sight-seers. In short, within the memory of many people not very old, Niagara Falls has changed from a pleasant, fairly open village, dependent mainly upon visitors to the Falls, to a crowded and in places, it must be acknowledged, not very attractive manufacturing town."

The changes proposed in the city plan for Niagara Falls are comparatively few, and follow natural laws of city growth. There is, or should be, a good reason back of every proposal of change in the plan of a city. Such changes should not be arbitrary. They should follow lines of least resistance, and be directly related to elements of distance, direction, grade, and other fundamental factors.

Niagara Falls is ahead of many other cities that have taken up city planning work in the fact that interest in the project exists in the city government itself. Therefore Niagara Falls starts where many other cities have taken much time to reach. In other places boards of trade and chambers of commerce have worked for months, sometimes years, to incite in the City Council the interest in the city planning program that the Niagara Falls City Council already has. On the other hand, it should be

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noted that there is no lack of interest on the part of the Chamber of Commerce. In fact, it is one of the most progressive in the country, and under good leadership it has coöperated heartily from the beginning with the city government in the promotion of the city planning work.

The principal recommendations for Niagara Falls have to do with the following subjects: Rail and water transportation; main thoroughfares; the park system; the districting of the city; and the proposed civic center.

The railroad relocation proposal is a study for the new main line location and the elimination of grade crossings. The plan shows existing railroad property, new property to be acquired, and abandoned railroad property.

The following is a summary of the principal points submitted in support of the plan, especially the recommendation that the location of the railroad right of way should be east of Sugar Street:

1. The location of the railroad right of way is relatively more important than the location of the union station.

2. While the tourist interests of Niagara Falls should be more carefully served, the industrial interests are of even greater consideration.

3. The construction of the new railroad right of way in any location west of Sugar Street would be decidedly objectionable, especially when the direction of the prevailing winds is considered and the effect upon workmen's homes.

4. The difference in cost on account of the interference with existing conditions — streets, buildings, etc. — between a location west of Sugar Street and east of Sugar Street would be great.

5. The separation of grades is a relatively easy problem for a railroad located east of Sugar Street.

6. The new location should be chosen with farsighted regard to the probable extent and area of the city of Niagara Falls when it reaches a population of 100,000

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people or more. The decision should be one which will be satisfactory, not only now but say twenty-five years from now.

Several other locations have been proposed, all of them west of Sugar Street in the more built-up and developed sections of the city. These locations pass through territory where city streets have already been laid out or constructed. If the streets were not carried through, much inconvenience and damage would result. Moreover, such an interruption would produce a very bad street system that would be almost impossible to correct because of the numerous property holders and the cost. For example, the particular location west of Sugar Street that was given the preference in discussion by the engineers involved a total of twenty-eight crossings at grade.

The new main line location proposed east of Sugar Street would cut through territory now practically unoccupied, and thus free from questions of grade elimination. It would only be necessary to provide for the main thoroughfares eight crossings in all. The new subdivision of the area would take the proposed new railroad location into account and do away with dead end streets and inaccessible lots.

The improvement of the circulation of Niagara Falls involves the selection of existing streets best located for traffic, street extensions, the location of new streets where necessary, and the adoption of a policy for widening, now or later, of all main thoroughfares of inadequate width at present.

The park system proposed for Niagara Falls may be briefly outlined as including:

1. PUBLIC SQUARES
2. PLAYGROUND PARKS
3. SCHOOL GROUNDS
4. LARGE PARKS
5. PARKWAYS
6. AUTOMOBILE BOULEVARD

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A zone plan and zone ordinance have been submitted as a part of the city planning studies. In the original plan the city was divided into six districts, as follows:

- A. FIRST RESIDENCE DISTRICT
- B. SECOND RESIDENCE DISTRICT
- C. APARTMENT DISTRICT
- D. BUSINESS DISTRICT
- E. INDUSTRIAL DISTRICT
- F. UNRESTRICTED DISTRICT

Later it was found desirable to add Third and Fourth Residence Districts, making eight divisions in all.

A study of the proposed common and the grouping of public buildings has been submitted, together with sketches illustrating the city hall in a grouping of public buildings, and the band-stand as a feature of the war memorial.

It is sometimes said that city planning schemes are not carried through; that plans are made, and then filed away, and no action taken. To some extent this is true. The execution of comprehensive city plans requires time, money, authority, and the formation of favorable public opinion. With the possible exception of Chicago, no large town or city in the United States has yet taken city planning very seriously. Chicago's methods have been more logical, more persistent, and more systematic.

Assuming that a publicity campaign is an indispensable feature of a city planning program, how can that campaign be best organized and carried out? Should the work be inaugurated and directed by the city planner, the city government, the chamber of commerce, or a special city plan commission? The city planner is not a professional publicity man, and he is usually not a citizen of the city for which the plan is prepared. His contribution is necessarily limited to the preparation, in as popular a form as possible, of his plans and reports, together, perhaps, with a personal presentation of those plans and reports to a public audience. After that, his active par-

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ticipation in a local educational campaign would be of doubtful expediency.

The city planning authorities should be relied upon to outline, direct, and execute the educational campaign that must necessarily accompany any large city planning program. In no other way can the presentation be wide enough, nor the discussion authoritative and far reaching. The city planning authorities, however, cannot hope to be thoroughly effective unless they can secure the active coöperation of voluntary social, civic, and other groups of citizens. The whole public can be effectively reached only through the assistance of chambers of commerce, women's clubs, labor unions, churches, and all other organizations to which the people of the city are accustomed in their daily life to look for information and guidance.

PLANNING PROBLEMS OF INDUSTRIAL CITIES

THE HALIFAX DISASTER AND REHOUSING

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On the sixth day of December, 1917, the French munition ship, *Mont Blanc*, loaded with T.N.T. was coming up the harbor of Halifax; a Belgian relief ship, the *Imo*, was going out to sea. They collided in the Narrows. Benzol on the deck of the *Mont Blanc* was ignited, captain and crew abandoned the ship, which drifted towards the Halifax shore; the T.N.T. exploded and two square miles of the city were laid waste. Fires raged in the ruins, and that night came a blizzard such as Halifax had rarely experienced before.

Fifteen hundred persons died in the wreckage, thousands were seriously injured, tens of thousands wandered homeless in a region more completely devastated than cities on the French battle front that stood weeks of heavy bombardment.

Rescue work began at once, at first haphazard, then organized under a temporary committee. Relief measures grew from local first aid to assistance of the most substantial kind from cities and states near and far. Large funds of money were appropriated to carry out immediate relief of human suffering and later a program of reconstruction took definite form.

Six weeks after the explosion a relief commission was appointed. The ruins were cleared away, and with builders working day and night, colonies of temporary houses

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sprang up on the commons and public grounds of the city, and some five thousand people of the devastated area were more or less housed in a remarkably short time. Approximately eight thousand houses have been repaired. Industries that faced ruin have been sustained by aid in rehabilitation, and permanent housing to the extent of seven hundred homes is now rapidly nearing completion.

The Relief Commission, under the energetic and untiring leadership of its chairman, Mr. T. Sherman Rogers, K.C., ably assisted by Judge Wallace and Mr. Fowke, his fellow commissioner, immediately undertook an active program to administer the investment of millions of dollars which had been provided for relief purposes, involving the complete rebuilding of districts in which the houses had been destroyed beyond any hope of repair.

The Commission called into consultation Mr. Thomas Adams, town planning advisor, Commission of Conservation, Ottawa, and Ross and Macdonald, architects of Montreal.

The work of planning a greater and better Halifax had had the careful study of Mr. Adams for some years past, and extensive areas of undeveloped land surrounding the city had been sufficiently surveyed to fix the boundaries of the several city and county schemes.

DEVASTATED AREA

Immediately following the appointment of the Relief Commission, that section of the city more or less completely destroyed by the explosion, comprising some 325 acres and now known as the devastated area, was set aside to be dealt with by the Halifax Relief Commission under statutory provisions included in the Halifax Relief Act.

Through the courtesy of Mr. Adams, and under his constant supervision and criticism, Mr. H. L. Seymour, his able assistant, has been almost continuously employed in

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the careful consideration and study of this particular area, with the result that definite boundaries have been fixed by survey lines, street grades have been established on all main thoroughfares and building lines laid down for all properties throughout the area. Definite sections have been set aside for residential and industrial development and areas fixed for first and second class construction.

The Halifax rehousing problem differed radically from that presented by the usual industrial town or housing development, in that well developed streets had existed in this area before the explosion, and the water and drainage service in the streets was still intact and must, if possible, be taken advantage of. The original city plan of this section, having little or no regard for the ground contours, was naturally most unsatisfactory, with streets arranged on a hillside in rectangular blocks, so that the cross streets mounted straight up the hill at excessive grades with main thoroughfares only at the top and bottom of the slope, having no convenient means of communication between them.

In the study of the new town planning scheme it was decided to retain as many of the old streets as possible, preserving the existing water and service lines, and to introduce two new diagonal thoroughfares crossing midway up the slope, so as to give communication at easy grades between the upper and lower levels, that is, between Gottingen and Barrington Streets, the two main thoroughfares running north and south paralleling the harbor and Richmond Slope.

WIDTH OF STREETS

Careful consideration was given to the study of the main traffic thoroughfares, with the result that the diagonal boulevards were fixed at a width of eighty (80) feet, and while wide streets have been established in certain instances for traffic reasons, and as an incentive to a more

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desirable housing development, still many existing streets on the other hand bearing no direct traffic have been reduced, all street widths being fixed with regard to their grades, length and estimated traffic.

BUILDING LINES

A general plan with regard to building lines has been adopted, fixing a distance of not less than fifteen (15) feet from the street line where lots are one hundred (100) feet deep or over. For shallow lots the set-back has been reduced three (3) feet for every ten (10) feet of reduction in the depth of the lot, subject to proper architectural treatment being given to the building. A scale computed in accordance with this rule resulted as follows:

Lots 100 feet deep		set back 15 feet
" 90 "	" "	" " 12 "
" 80 "	" "	" " 9 "
" 70 "	" "	" " 6 "
" 60 "	" "	" " 3 "
" 50 "	" "	" " nil

OPEN SPACES

On the original city plan of this district there were open spaces having a total area of approximately five (5) acres, but so located as to be of indifferent value. In the study of the new plan Mr. Adams has abandoned these open spaces, absorbing same within the building area, the site of the old parks being exceptionally good locations for building purposes, while due to their position and the contour of the ground they are practically impossible as playgrounds or satisfactory park lands.

For open spaces other than streets and paved areas, Fort Needham with an area of over eight (8) acres has been acquired by the Relief Commission for a public park, while playground areas have been provided in the form of

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open spaces or courts of three hundred (300) feet in depth, and one hundred and forty (140) feet in width, forming the grass areas or open courts between houses of the "court development," eight of these courts being provided in this particular development.

Fort Needham is very well situated as a park for the southern section of the devastated area and occupies the highest land in the vicinity (lying at an elevation of from 180 to 225 feet above ordnance datum), with remarkably beautiful views of the harbor, Bedford Basin and the ocean. It is, however, unsuitable for building purposes owing to its steep approaches.

BUILDING RESTRICTIONS

Building restrictions were carefully considered and established, governing the spacing of houses and the class of materials used in their construction. The subdivision of land acquired by the Commission has been adjusted on a unit of 120 feet, giving two 60-foot lots, three 40-foot lots (and in terrace groups, four 30-foot lots and even less).

A restricted building area east of Gottingen Street extending to the water front permits only of the construction of the better type of buildings, having masonry, brick, concrete or stucco walls with a fireproof material for the roof. Detached dwellings where of frame construction must in no instance be placed closer than eight (8) feet to the side lines of the property, thus giving a minimum distance between houses of this type of sixteen (16) feet.

Semi-detached or terrace groups of houses must be so constructed as to be entirely separated by fire party walls of brick or other acceptable fireproof material.

General standards of building construction, standards governing the minimum size and heights of rooms, area of windows, stairs and clothes closets and general sanitation, etc., have been adopted and rigidly adhered to, the standards so fixed being practically identical with those accepted

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by the United States in connection with their permanent war housing program.

Service lanes have been provided, containing all service features such as sewerage, water, gas and electric light. Lanes are twelve (12) feet in width with curb and pavement in every instance.

HOUSING

In order to determine upon a definite program as to the best procedure to follow in obtaining the reconstruction of the greatest number of individual homes within the shortest possible time, it was imperative that accurate information should be obtained as quickly as possible on the following essential facts:

- (a) Number of families rendered homeless by the disaster for whom provision must be made.
- (b) Detailed information as to size and general condition of the homes destroyed, especially as to the amount of accommodation, the number and size of rooms, character of construction and the condition of the building for valuation purposes immediately prior to the explosion.
- (c) The cost of replacement by new building under existing inflated building values.

From records obtained by the Commission in connection with the first item, it was estimated that one thousand families must be rehoused, this estimate being subsequently reduced to seven hundred and fifty.

Information as to the individual requirements of the second item could only be obtained through personal interview and reference to the city record.

Records of value of homes prior to the disaster were obtained through the active work of an appraisal board appointed for this purpose.

The necessity of interviewing each individual house-

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holder who had lost his home, ascertaining his requirements and providing a plan to meet the individual need at reasonable cost of reconstruction, was a task requiring considerable patience and time. In the meantime it was found essential immediately to house as many families as possible in more permanent structures than those provided for temporary relief, and it was realized that this could only be accomplished by the rapid construction of some four hundred dwellings of varied design and accommodation. For this purpose, a suitable plateau at the crest of the slope of the devastated area was procured and active building operations started promptly. Beyond this development at the crest of the hill and away from the harbor, there had existed a district in which the houses were of a less pretentious sort than those on the slope itself, and as these houses were at some distance from the point where the explosion took place, they were not entirely destroyed. A somewhat better type of house was desired on the crest of the hill and on the slope overlooking the harbor, and it was felt that the first group of houses should more or less form a screen between the industrial district and the residential section on the slope of the hill.

The work of rehousing has therefore divided itself into three parts, which are known as —

The Group or Court Development
Frame Dwellings
Individual Housing

THE GROUP DEVELOPMENT

The purpose of the group or court development was to give shelter to as many families as possible while their own permanent houses were being built, and afterwards to provide dwellings which might be rented by those families who were tenants of the devastated area. It was decided to build dwellings of from four to six rooms each, with

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bathroom, electric light and all modern sanitary conveniences, and to arrange the buildings in short rows, composed of two, four and six dwellings each, on each side of a series of wide grass courts which would serve as playgrounds for the children. To the rear of the houses service lanes have been constructed with cement curb and pavement. These service lanes communicate with the main thoroughfares running north and south and are of sufficient width to permit of the passage of tradesmen's wagons. In each of these lanes has been installed the water and sewer services for thirty dwellings. Service yards have been provided in the rear of each dwelling of a sufficient area to meet the usual requirements.

The developments of the courts in front of the houses provides for two twenty (20) feet paved streets at either side of the grass or play area, with concrete curb and four (4) feet cement sidewalks and suitable approaches to each home.

The street lighting has been arranged by means of underground conduit, so that no poles obstruct or disfigure the general appearance of the courts.

The buildings containing four dwellings are of six separate types, varying as to plan and accommodation. In each of the plans the middle dwellings show five rooms and a bathroom, and the end dwellings six rooms and a bathroom. Where only two rooms are obtainable on the first floor, as in the middle apartments, a kitchenette has been provided by partly screening off a portion of the dining room and kitchen and placing in the alcove the service fixtures, such as range, sink and domestic hot-water heater. This leaves a large part of the room quite free for use as a dining room.

The six types of buildings containing four dwellings each differ from each other as to exterior treatment, both in design and in the use of materials, the variation being obtained principally in the study of a variety of roof treatment and a combined use of hydro-stone stucco and

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half-timber. In this way, it was found possible to have, with few variations in plan, twenty-four dwellings, each different one from the other sufficiently to give a certain individuality.

In this particular group of housing of three hundred and twenty-six dwellings in all, there are thirty-seven buildings containing four dwellings each, the remainder of the development being composed of buildings containing six families and some buildings containing two dwellings each. The buildings containing six apartments each are of five different types and in plan are much the same as the four-family types. The elevations are, however, quite different and in some instances the plans have been reversed in order to give an even greater variety of architectural treatment.

Each dwelling is provided with a liberal front entrance porch of sufficient size to be used as a covered veranda, and is raised approximately eighteen (18) inches above the finished grades. Covered service galleries of six (6) feet in depth are also provided in the rear of each dwelling, opening off the kitchen in each instance and partially forming the roof to basement entrance.

Each plan shows a vestibule, which was found necessary due to the Halifax climate, and in every case a coat closet adjacent to the entrance hall. One family bedroom and two smaller bedrooms are provided in each of the five and six room houses, and clothes closets of a minimum depth of twenty-two (22) inches open off all bedrooms, with the exception of a limited number of the middle apartments.

Each dwelling is provided with electric light and full plumbing, including completely equipped bathroom and kitchen, with laundry trays in basement. Each dwelling has a separate outside entrance to the basement, the basement being constructed in concrete and having finished cement floors.

Scattered throughout the group development, there are thirty-two buildings of the flat type, each containing

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two self-contained apartments, one above the other, each with its individual entrance on opposite sides of the building. These buildings are of three different arrangements as to plan and elevation, and range in accommodation of five, six and seven rooms, with bathroom.

After considering carefully the various local materials available for use in the construction of the buildings, frame construction with either drop-siding or shingle was found to be the most economical, and the next cheapest was found to be a form of pre-cast concrete block, known to the trade as "hydro-stone," the third—stucco on frame, and the most expensive—brick or concrete formed in place.

As a permanent and fireproof material was desired, it was decided to make use of hydro-stone, and to manufacture this block at a plant built for the purpose by the Commission at South Eastern Passage, Nova Scotia, where a plentiful supply of clean gravel and sand was available at low cost.

It was also decided to roof the buildings with slate, but to construct the interior frame, floors and partitions of wood, with finished walls of hard plaster. All interior woodwork is of British Columbia fir, with natural varnish finish, and the finished floors throughout are of edge grain fir. The exterior and party walls of all buildings are of hydro-stone and the foundations of mass concrete. Where the concrete blocks are exposed, a faced block is used, which is constructed of crushed granite, giving a mottled granite effect. Where stucco finish is used, the stucco is applied to the rough concrete block.

FRAME DWELLINGS

Several tracts of land having been acquired by the Commission, seventy (70) self-contained dwellings, varying in size from 21 feet by 27 feet to 25 feet by 33 feet were constructed simultaneously with the group development throughout the unrestricted part of the devastated

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area, these buildings being completed and occupied in the course of five months' time.

INDIVIDUAL HOUSING

In addition to the group and frame developments, one hundred and ten (110) homes have been built, scattered throughout the area, designed to meet the individual need in each case, and contracts covering the construction of one hundred and fifty (150) homes in addition to those already completed are being proceeded with in an energetic way. These homes vary in size, accommodation and cost in relation to each individual need and the size of house owned prior to the disaster. The individual homes are constructed of hydro-stone, stucco and wood.

COMPARATIVE COSTS

For purposes of comparative cost, the local material and labor market were carefully studied and estimates prepared (using varying types of construction) of a detached two-flat house having four rooms and bath on each floor, with outside dimensions 28 feet by 29 feet, two full stories in height. Each type of construction investigated is indicated in the following table in order of cost, beginning with the lowest. Since all interior finish, such as lath and plaster, paint, finished woodwork, floors, etc., is applicable to each type and therefore practically unchanged as regards cost, consideration for comparative purposes has been limited to the several forms of wall construction only.

Considering the lowest priced construction as 100%, the comparative costs were determined as follows:

No. 1. *Frame Sheathing with Shingle and Stain.*

Exterior walls, 2 × 4 spruce studs, sheathed on the outside with 7/8-inch tongued and grooved spruce, covered with one layer

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of 1-ply prepared roofing, and shingled with
No. 1 Clear Shingles dipped and stained with
creosote stain 100%

No. 2. *Frame Sheathing with Drop-Siding, Painted.*

Construction similar to No. 1, replacing
shingles with spruce drop-siding, painted
three coats of lead and oil paint. (See
Diagram, Type No. 2). 100.5%

No. 3. *Concrete Pre-Cast Block.*

Exterior walls constructed of two lug
concrete blocks set in cement mortar. (See
Diagram, Type No. 3). 101.5%

**No. 4. *Frame Sheathing, Bishopric Board, and
Cement Stucco.***

Exterior walls, 2 × 4 spruce studs,
sheathed on outside with 7/8-inch tongued
and grooved spruce, bishopric stucco board,
and finished with cement stucco . . 104%

**No. 5. *Frame Sheathing, Furring, Lath and Cement
Stucco.***

Exterior walls, 2 × 4 spruce studs,
sheathed on outside with 7/8-inch tongued
and grooved spruce, covered with one layer
of 1-ply roofing, furred with 1 × 2 fur-
ring, finished with wood lath and cement
stucco 105.5%

No. 6. *Brick Veneer.*

Exterior walls, 2 × 4 spruce studs,
sheathed with 7/8-inch tongued and grooved
spruce sheathing, covered with one layer of
1-ply roofing and veneered with brick. (See
Diagram, Type No. 7) 105.9%

No. 7. *Solid Brick.*

Exterior walls of brick, two bricks of
thickness 106%

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No. 8. *Frame Metal Lath and Cement Stucco.*

Construction similar to No. 5, replacing wood lath with metal lath. (See Diagram, Type No. 9) 106.7%

No. 9. *Monolith Concrete.*

Exterior wall poured concrete 8 inches in thickness rubbed to an even surface on outside face 118%

It was found from actual comparison of cost after several months of operation of the hydro-stone plant, that the difference in cost between frame building with shingle, and hydro-stone, was two and one-half per cent ($2\frac{1}{2}\%$) instead of one and one-half per cent ($1\frac{1}{2}\%$) as estimated, this increased cost being largely due to transportation costs from the plant to the works and reduction in the estimated output of the plant due to labor difficulties, this increase in cost per dwelling of the group development amounting to \$93.83.

HYDRO-STONE MATERIAL

Hydro-stone, the material decided upon for the exterior of the houses, consists of a mixture of concrete, composed of gravel, crushed stone, sand and Portland cement, with sufficient water to crystallize the cement thoroughly, moulded under heavy pressure into the form of building units, and then cured in steam or rooms kept moist, to prevent rapid evaporation.

The heavy pressure admits of the use of a sufficiently wet mix to form a high grade concrete, and the system of moulding admits of facing with crushed granite, marble, mica-spar or colored sands.

The block is nine (9) inches by twenty-four (24) inches on the face and is built into the wall either as a two-piece wall or as one piece. The two-piece wall comprises "T" shaped units laid up in header and stretcher bond, break-

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ing joints alternately back and front. The wall has continuous horizontal and vertical air spaces throughout. The inside and outside walls having no direct contact, form a wall thoroughly insulated against heat, moisture and frost.

The one-piece wall is well adapted for small buildings or residential work, and this form of construction has been adopted in the group development, with the use of a bishopric board on the inside of all exterior walls. The blocks have two webs projecting from the back, spaced on 12-inch centers, and are laid up so as to break joints and form a strong, self-sustaining wall, ranging from 5 to 12 inches in thickness. Furring strips are fastened to the ends of the webs by a simple clip laid in the joint. Any form of lath is nailed to the furring strips and plastered in the usual manner.

The hydro-stone machines are operated in the form of a press, estimated to exert a pressure of some 150,000 lbs., against the face of the block. The plant was equipped with five machines with a total output covering from 3,500 to 4,000 blocks per day. The pressure against the face of the block while in the mould compacts the concrete, squeezes out excess water and fills up the voids, forming a block with a dense face and square sharp edges, which is immediately removed from the mould.

The concrete mixture used is a comparatively dry mix, the proportions being determined after careful experiments with the sand and stone available. In the manufacture of face blocks, white Atlas Cement was used with white sand in order to obtain the full effect of the crushed granite. The facing material is filled into a depth of $\frac{3}{8}$ -inch on top of the ordinary concrete, the pressure applied at once, thus securing a thorough bond between the facing and the body of the block. When washed, the blocks are removed to a steam room where they are cured (approximately forty-eight hours), then placed in the storage yard for shipment to the works.

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On account of the large size of the blocks, nine inches by twenty-four inches ($9'' \times 24''$), they are laid up very quickly and remarkable progress has been made, a small number of masons being able to handle the output of the plant as fast as it can be delivered to the building.

A PLAN FOR THE BIRMINGHAM, ALABAMA, DISTRICT

WARREN H. MANNING

Fellow American Society Landscape Architects, Billerica, Mass.

In the Birmingham District are Bessemer, Birmingham, Ensley and smaller towns. These lie on either side of Enon Ridge in the Opossum and Jones Valleys. The whole lies west of the Red Mountain Ridge. To the east of the latter ridge is Shades Valley with the precipitous face of Shades Mountain Ridge lying east of it; and still farther east is the Coosa and Cahawba River Valleys, that join to form the Alabama River. To the west of the town is the Black Warrior River, a branch of the Tombigbee that joins with the Alabama River and flows into Mobile Bay. On the Black Warrior River are seventeen locks that permit navigation by shallow draft barges from Mobile Bay to several landings that lie from 16 to 26 miles from Birmingham and Bessemer.

It will thus be recognized that the Birmingham District is located at the lower end of the Appalachian Mountain Range near where the ridges pass into the level coastal plains region to the south and east.

When the river transportation referred to is well enough established to compete with, and supplement the railroads, an important terminal and manufacturing district is sure to be established at one of the river landings, probably at Taylor's Ferry. Here the intersection of the Mulberry and Locust branches of the Black Warrior River form wide waters.

There are also along the high bluff tops, that overlook the wide water above the upper locks, many beautiful

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residential sites. This is the only local body of water that provides for boating.

Road lines on good grades have already been located to several of these landing points. These are likely to form long arms of the city that will correspond to the Rochester, N. Y., arm to Lake Ontario, and to the long narrow strip that is extended from Los Angeles to its San Pedro harbor. Studies have also been made for possible water transportation to the Black Warrior River through locks in Valley Creek from Bessemer. Several of the eleven steam railroad systems, and main highways, from the middle-west and northwest, enter the district through easy passes between the hills that lie west of the city. To the southeast, one railroad passes through a gap in the Red Mountain Ridge; and to the northeast five main-line roads, and the principal thoroughfares that give connection to the great seacoast and coastal plains to the east and northeast enter through Red Gap. This Gap may, therefore, form one of the most important portals to any of our American cities.

From the north and northeast, highways that connect with the densely populated regions of New York, Pennsylvania, and New England enter through the Mount Pinson and Trustville Valleys, and from the easterly side of the Red Mountain Ridge. The latter thoroughfare passes through Red Gap to Jones Valley. The Mount Pinson and Trustville roads enter directly into Jones and Opossum Valleys. These roads form a part of the Great Appalachian Highway that is being gradually developed through mountain valleys and along ridges through New York, Pennsylvania, and New England by way of Harrisburg, Chattanooga and Knoxville to Birmingham. All these great thoroughfares here unite and will pass on through the Black Warrior and Tombigbee Valleys, through Mobile and on to New Orleans.

The Birmingham regional study made it evident that the most essential thoroughfares for highway and trans-

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portation through this district must be up and down the center of the Jones and Opossum Valleys, rather than across them. At present the greatest number of connected thoroughfares are across the valley. This is due to the development of ore deposits that lie chiefly to the east, and coal deposits that lie chiefly to the west. Therefore, the recommendation of the District Plan provides for broad takings along both valleys to include the flat, flooded areas and to provide for thoroughfares along the margins that will serve as dikes to control floods. These takings would also provide local parks and playgrounds at frequent intervals.

At first it was thought that the lands to the west now in farms would be the farming region of the future; but it was found that this territory must ultimately be used for growing mine timber, and that the farming district would eventually be toward the north and northeast. This is another reason for providing adequate thoroughfares up and down the valley.

It was a study of such regional factors as these that determined the main features of the District Plan, and to include in this study a regional plan that included loop roads out into the country and back again. These would be from 60 to 100 miles or more in length and along them would be, at convenient and attractive spots, places for picnics, camps and recreation. Each one of these loop roads was studied with men of Birmingham who knew the region and could lay down the most attractive lines to unite existing and proposed roads into such loops. In this connection it must be recognized that for recreation purposes, or for the purpose of gaining a knowledge of the region about a city, the modern city park system that can be covered in an hour or two by automobile is of little value.

Owing to the foresight of railroad administrators two belt lines are already established in the district to connect nearly all the railroads. One is in and around the

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business district; the other is, for the most part, outside the important residential and business district boundaries. The plan provides for a great circuit thoroughfare that will approximately follow the outer belt line of the railroads.

Two great terminals and exchange yards have also been suggested: one at the northern, and the other at the southern end of Opossum Valley, in which lie the most important industrial establishments.

One of the problems is the elimination of the hundreds of grade crossings in the district. Mr. Julian Kendricks, the city engineer, has planned to eliminate many of these by elevating the main railroad lines through the city.

The city and the county working together have established a comprehensive sewage system with main outlets at purification beds, and it is their plan to extend these outlets to larger tracts for purification as the city grows. Good water is also supplied from an artificial lake on the Cahawba River beyond Shades Mountain, and to the northeast of the district. This, however, will not take care of the great industrial districts of the future in this region; and it will not be many years before a comprehensive study of the state should be made to determine upon a source of supply that will take care of its manufacturing regions here, and to the northward along the Tennessee River.

As yet the very important question of zoning the district has not been considered. There are, however, fairly well defined zones established for manufacturing, industrial housing and the higher class residential districts. The former is generally in the valleys and the latter on the ridges. The first residential districts are on steep slopes and the summit of Red Mountain Ridge, and plans are being made for its extension of these districts, especially to the northward.

The Tennessee Coal and Iron Co., one of the principal companies here, has built several up-to-date employees' villages in the district.

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There are sections here where a zoning system ought to be established and constructed in such a way that it will last for about thirty years, as that is the period of best service for most buildings. At the end of this period, this district should be wrecked to provide for the extension of the manufacturing and industrial districts. If this kind of zoning were anticipated and definitely provided for, it would be in the interest of all concerned.

Birmingham is under rather peculiar financial restrictions. Its commission form of government is not permitted by the state to make a tax levy beyond a certain limit, and this limit will not permit many expenditures beyond those which are actually essential for the maintenance of the city. At present, Jefferson County, in which the district lies, has a large income which enables it to keep the most important outlying roads in good condition. The metropolitan district that was laid down on the plan includes about the same area as the Government's ten-mile radius about our American cities that is fixed as their metropolitan district. This would include about one-half the area of Jefferson County.

THE STEAM RAILROAD IN RELATION TO THE CITY PLAN

EDWIN J. FORT

City Manager, Niagara Falls, N. Y.

The need of the city for the railroad and of the railroad for the city are mutual and in most cases equal. The one is dependent upon the other for its principal means of business communication with the outside world and for transportation of its most common necessities and of the products of manufacture and commerce from which its wealth is derived. The other is dependent upon the one for business which makes its existence possible.

This interdependence is something which even the most thoughtless can understand. Where railroads are pioneers in the development of new territory, they always find it desirable and necessary to lay out new town sites at strategic points along the lines and to give whatever impetus to the growth of these embryo municipalities they are capable of giving in order to increase business. It has been my duty in times past to prepare elaborate plans of such town sites, which may possibly have been useful in impressing the prospective purchaser of stock with the brilliant prospects of the road.

SHOULD WORK TOGETHER

In the same degree that our domestic commerce exceeds our foreign commerce, the business of railroads is made up of intercity transportation and their sustenance is derived from the municipalities which they traverse. They are more than anything else the connecting links between municipalities.

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On the other hand, the prosperity of the American municipality is almost entirely dependent upon railroad transportation and its future prospects are judged largely by the number and directness of its railroad connections. The advent of a new road is hailed by the young city as an added advantage and attraction to business enterprises. It is a source of satisfaction to the business man because of the prospect of new business competition in transportation, lower rates and better service. The location of some, even of our largest, cities has been fixed and determined by the location of railroads. There is probably no reason why the city of Denver is located as it is, other than that it is the point of junction of a number of railroads. The same may be said of numerous other cities, although they may have grown to such size and importance that the facts connected with their foundation and early history are overlooked or forgotten.

Under such circumstances it might be natural to expect that both the city and the railroad would recognize the fact that the interests of one were irrevocably bound up with those of the other; that their relations would be agreeable and that each would endeavor in every reasonable way to serve the other's interests. Such is not generally the case, however.

CAUSE AND EFFECT

In the average-sized city the railroad may be said to be the main and in many cases the controlling feature of the city plan, and nearly all other parts of the plan are arranged with reference to it or bear certain definite relations to it.

Where the topography is not peculiar and natural tendencies have not been interfered with by legal restriction or otherwise, and where, as is the case in many small municipalities, there is only one railroad which passes through in a straight line, its influence upon the city plan

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is a minimum and few complications are presented to the city planner because of the presence of the railroad. The general arrangement of the various classes of buildings will be found to be about the same in all cases and the order of future development can be fairly well predicted. We may expect to find manufacturing and other industries, to which delivery of materials to and from cars without cartage is essential, occupying positions adjacent to the yards and tracks. The retail business districts — shops, markets and offices — come next in order of location and, farther away, residence districts of various kinds.

THIS IS FALLS' PLIGHT

If steam railroads are allowed to traverse the city in any direction, to fix the locations of yards and stations with a view solely to their own interests, the plan of the city becomes a patchwork which no changes and no amount of skill in the city planner can make entirely satisfactory from the standpoint of comfortable, convenient, healthful and attractive living conditions. It is difficult to maintain a high standard of civic pride if one is compelled to live next door to a railroad yard where buildings are constantly deluged with smoke and it is necessary to paint in the most dismal colors, and where there is constant noise from trains and switch engines.

Where natural tendencies in the growth of the city are interfered with by topography and the location of perhaps several railroad lines is controlled by it, the problem of the city planner is more complicated and the city plan is more vitally affected by the manner in which this problem is solved. The question as to whether all interests will be better served by providing a single union station or several stations, the location which will be most convenient for business and least objectionable to residence districts, the possibility of making such changes in the location of railroad yards that the nuisances produced

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by them may be confined to one portion of the city and that they may be, at the same time, convenient of access, are frequently most perplexing. They are problems upon which unanimous agreement can seldom be secured. The land available for such layouts as are necessary to minimize the amount of switching necessary in handling trains and for the location of industrial establishments, sidings, etc., adjacent to such yards is also an important consideration and one which is sometimes overlooked.

LACK OF FORESIGHT

It is undoubtedly true that in the early history of many a municipality the rate of future growth is underestimated by its own citizens. The fact that the natural increase from its own population takes place in a geometric ratio and that, if living conditions are attractive, it acts as a magnet in its attraction for population from other localities, the strength of the magnetism increasing as the city grows, is not appreciated. There is also little or no appreciation of the conditions which will be created a generation, say, in the future by lack of foresight in railroad location.

In the beginning, roads are greatly sought after. Inducements of all kinds are offered for any additional facilities which they can furnish. Grants of right of way along or across the principal business streets are made, and little or no thought is taken of the time when the town will have become a city and street traffic so congested that conditions may become almost unbearable. As the city grows, any satisfactory change becomes more and more expensive till the *status quo* increases to such proportions that conditions become fixtures which it is impracticable to change, and the city is permanently handicapped by them.

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DEATH AVENUE

One of the most noticeable cases in point is that of Eleventh Avenue in New York City, popularly known as "Death Avenue." For years the condition of this street has been a thorn in the side of the city and many efforts to secure the removal of steam railroad freight traffic from its surface have been made. A committee of the Board of Estimate and Apportionment, a few years ago, labored long and faithfully to this end, but failed to reach a basis of agreement which would satisfy all interests. The work of this committee was made the subject of a political attack which was largely responsible for the overthrow of one of the most intelligent administrations which the city ever enjoyed. It seems possible that no such agreement may be reached for another decade or generation.

The cities of Syracuse and Cleveland present other examples of steam railroad location so detrimental to the interests of the public that it is proposed to spend millions of dollars to eliminate grade crossings and for railroad relocation. Examples might be multiplied where lack of foresight and wisdom on the part of municipal authorities in granting rights of way almost without condition through portions of a city which should have been reserved for residence purposes or for business has stunted and strangled the growth and development of a whole city or of extensive areas, by the noise, dirt, danger and general inconvenience to street traffic incident to surface steam railroad traffic.

RAILROADS HAVE DICTATED

This condition has frequently arisen from the fact that in the process of general industrial development the railroad came first, and through the advantage of laws secured by the influence which it has been able to bring to bear upon state legislature, by the plea that it should not

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be subjected to the annoyance of local political authorities in the conduct of its business, it has been able to dictate all its dealings with the municipality and defeat every effort made for the betterment of conditions.

On the other hand, the necessities of productive industry, the convenient and economical conduct of ordinary business, demand that transportation facilities should not be relegated altogether to the purlieus, but should be reasonably close at hand and accessible so that terminal charges may not be excessive.

To a very great extent the presence of the railroad determines the character of improvements in its immediate neighborhood, the location of manufacturing industries, development by certain classes of business enterprises, or the poorest class of residences or tenements. The slums and undesirable resorts and the nuisance-producing enterprises are usually not far from the railroad, while the more desirable residence districts have a tendency to move farther and farther away as population increases. The impression gained from the window of a passenger car of the general character of a city or its attractiveness as a place of residence is not, in the majority of cases, a favorable one and does not do it credit.

When the topographical features of the surrounding territory are such that expansion in every direction is unrestricted, the evils of undesirable railroad location are not so serious, because the city can grow away from them and business can adjust itself; but when, as is the case in this city, the site is enclosed upon two sides by an international boundary line and a stream, which so far as the growth of the city is concerned is impassable, it is most essential to orderly growth and development that the problem of railroad location be given the most careful study, and be so worked out that all industries shall be adequately served; that shipping facilities shall be convenient and stations shall be located with due regard for the comparatively large passenger traffic.

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THE RAILROAD PROBLEM

We have here no more serious or difficult problem to deal with, in carrying out an acceptable city plan, than that of the treatment of railroads. What is now one city consisted originally of two distinct villages which had grown about and whose reasons for existence were, at the north end, the international bridge traffic, the business incidental to the federal immigration office, the extensive railroad yards and a small country district to the north and east; at the south end, the tourist traffic in connection with the Falls and the business of a small summer resort. The railroads came before either and found little difficulty in locating their lines in such a way as to best serve their own interests regardless of the effect upon further development.

As long as the tourist business was the principal and almost the only business, it was desirable that the railroad station should be located as near the Falls as practicable, and inducements were offered for placing it at Second and Falls Streets, its present location. The early generation of power and the location of industries in what is still known as the lower milling district, before the time when the transmission and present applications of electric current became practicable, made it necessary to furnish transportation to this district.

In accomplishing those two purposes, one of the most desirable sections into which the city could have expanded, and which lies to the eastward along the river, was partially occupied by railroad lines. The later development of power by the Niagara Falls Power Company and the location of industries which followed completed the occupation of this district. The bank of the gorge from the lower milling district to the former village of Suspension Bridge was similarly occupied. The Erie Railroad, not being able to reach the lower milling district and divide the business, cut through what otherwise might have been

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a most desirable residence district and placed its yard most advantageously to itself, — at the highest point and almost exactly at the point where the new civic center of the greater municipality is designed to be placed.

Later still, the Niagara Junction Railway was built by the Niagara Falls Power Company for the purpose of transferring freight between the industrial district along the upper river and the various railroads, so that, within its comparatively narrow limits of less than nine square miles the city is crossed from north to south by three surface railroad lines, and from east to west by two such lines. It also has within its corporate limits four separate and distinct extensive railroad yards. Obviously, the ideal in the way of a city plan cannot be attained unless some changes are made in those conditions.

SEVERAL ALTERNATIVES

There are several alternatives. Lines may be relocated so as to entirely eliminate some of the most objectionable ones. They may be elevated or depressed so as to allow streets to cross at grade, or they may all be allowed to remain as they are, depressing or elevating street crossings where, from time to time, it becomes necessary to do so.

The problem would be much simplified were it practicable to introduce terminal yards and stations, but such arrangements greatly increase the amount of switching necessary and the general expense of operation. They are generally resorted to only when through connections are not obtainable either at the termini of roads or where the size of the city or other conditions compel their adoption.

Regardless of what the final plan may be, great relief to every one concerned and considerable advantages to the railroads themselves would come from the electrification of all lines within the limits of the cities located along the

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Niagara frontier. The abundance of cheap electrical power and the rapid increase in business and population which is taking place should make such a change practicable in the near future.

Such changes as have already been made have consisted in elevating street crossings entirely above the tracks or depressing them below them in such a way as not to disturb them either as to line or grade. These changes add nothing to the embellishment of the city. They are not convenient for street traffic and they are expensive. While the more recent improvements of this character have no doubt been wisely planned, as it seems probable that the railroad lines affected will not be materially changed, an indefinite continuation of this method of grade crossing elimination would result in much haphazard building and waste of public funds.

If the city is to continue to grow through the development of its enormous resources in power and a corresponding increase in manufacturing industry, the time cannot be far distant when some of the handicaps caused by indiscriminate railroad location must be removed and the districts blighted by them reclaimed.

DISCUSSION

J. L. HARPER, *Chief Engineer Niagara Power Co.*

Mr. Fort's paper has so truly set forth the general principles in connection with this subject that discussion of it can only be taken up in the sense of further amplification of the local setting, and the particular and peculiar conditions obtaining in regard to Niagara Falls, N. Y.

The importance of the adoption of at least general outlines of a city plan is being more appreciated all the time. Many of the difficulties that now have to be met and the problems that are now crowding for solution could have been minimized and eliminated if earlier attention had been given these matters.

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For the last twelve years the writer has represented as engineer the City Commission charged with the elimination of grade crossings, and fully appreciates the detriment to Niagara Falls on account of its lack of a city plan.

This city is either fortunately or unfortunately located in a triangle formed by the mighty Niagara River, the Falls themselves forming the apex of this triangle above a smooth-flowing river about a mile in width and below a gorge 200 to 300 feet in depth and half a mile in width, which river and gorge are at the same time the boundaries between the United States and Canada, so that this city is restricted in its growth to practically one quadrant of a circle area, the center of which would be the Falls.

Imposed upon these conditions is the fact that within the city of Niagara Falls, and about two miles below the main cataract, exists one of the two possible and developed railway crossings between the United States and Canada that exist between Detroit and Montreal. This requires the maintenance into and through the city of a very large and important railway artery, representing through traffic as well as local.

In planning any city, its potentialities and ambitions must be taken into consideration. Niagara Falls, N. Y., with its available development restricted to one quadrant of a circle, still has potentialities and ambitions probably greater than any other similar area in the United States.

First, there exists at the apex of its inner angle the greatest concentration of hydro-electric energy found anywhere in the world. On account of Niagara being a boundary stream, it may be conceded for the purpose of this discussion that the city of Niagara Falls and the adjoining Niagara frontier within the state of New York will have a right to one-half of such part of this energy (which in its entirety amounts to in excess of 6,000,000 horse power) as may be found advisable to develop, with due regard to the continuity of a border stream, the protection of navigation and the preservation of scenic beauty.

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It is now apparent that these three features, with which the Federal Government has charged itself for their protection and conservation, can be amply taken care of with 40 per cent of the flow of the river, leaving on the New York side water sufficient to develop 1,800,000 horse power, which with proper and compensating structures will maintain an unimpaired scenic effect, with navigation actually improved.

Thus, this community, for which a city is to be planned, must have developed and transmitted across its own area in excess of 1,500,000 horse power, which all laws of conservation of energy require to be used as near as possible to the source of its development.

Therefore, the planning of a city on the Niagara frontier must be based upon the existent potentialities of its included water power. The municipalities that now exist on the frontier, namely, the city of Niagara Falls, Tonawanda, Buffalo and Lockport, will probably be welded and fused into one giant city, in which the present municipalities may only be boroughs. Therefore, the magnitude of the plan of a city on the Niagara frontier requires a forward look and a belief in the future that is outside of the scope of the projected lines which ordinarily represent the increase of population.

Every father and mother of soldiers who went to the great war probably appreciates now more than ever that the basic materials, the manufacture of which was made possible, even with restricted development, at Niagara Falls, were of such a character that the lives of these young men were safeguarded, and that the enemy could be fought with the output of hydroelectric energy instead of the lives of men. Without ferro-alloys, and other basic metal made in Niagara Falls, the quantities of guns, trucks, aeroplanes and shells would have been impossible; without phosphorus compounds, the smoke screens, which protected our soldiers both in transport across the ocean and in battle, would have been impossible, and by the out-

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put of our chemical and gas factories we were able to return to the enemy the horrors imposed upon our soldiers in gas attacks.

Therefore, with this knowledge in the minds of so many of the people of the United States it is probable that the appreciation of the benefits to the whole country of the development of the now wasted energy of Niagara Falls will cause them to demand a fuller development and cause them to turn a deaf ear to those whom a good lecture course is of more importance than the thousands of things that this energy can do for humanity if it is developed and applied.

These facts have been brought out to place before you the possibilities and probabilities of the future Niagara community. To illustrate further, let us take the present city with its population of 50,000, and a power use of approximately 200,000 horse power. It would appear that we use four horse power per capita, and this in a city where the principal industries consist, first, in the development and distribution of power, and second, in the application of this power to the manufacture and production of basic materials; while in a city of the type of Buffalo there is only one-fifth of a horse power used per capita.

In considering a community made up of both of the above classes, it is reasonable to assume that a city resultant from the possible development of power at Niagara Falls will have at least two people per horse power used, or this frontier may look forward to a population of between three and four million people.

The investments and monetary values represented in such a community would be: first and smallest, that of moneys in the actual development and distribution of power.

2. The moneys invested in the manufacturing plants that take the power and change it into raw materials, such as chemicals, alloys, metals, etc. This second class would

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have at least twice, and possibly three times, as much investment as the first class.

3. Further, upon these would be imposed the third step, that of fabricating plants which take the raw materials and work them into machines and commodities which would be sold directly to the people of the whole country, or redistributed to become parts of further fabrication and refinement in other localities, the third step multiplying many times the investment of the second.

4. Finally the fourth class, representing the homes, parks, schools, theaters, and all those developments and investments which have to do with the individuals working in the factories and their families, the fourth class possibly equalling the investment in the third class.

With this outline of probable future conditions before us, let us consider, "What is a city for which a plan is to be made?" It must necessarily consist of means of development and distribution of power and have means of receiving quantities of raw materials either by water or by rail, with immense rail facilities for interconnection of plants and service for fabricating factories, and last but not least, have proper homes and living conditions for the employees and their families.

A city planner, working on the problem presented by this community with its peculiar possibilities, must give special consideration to freight transportation, the development of power and the production of raw materials being the basic reason for a city at this place. Whether or not the railroads may appear to have encroached upon the residence districts in the small present municipalities is not so much a cause for concern as that a broad, comprehensive future transportation system should be worked out, that the freight handling and basic manufacturing should be concentrated in districts where their transportation problems are simplified, and that the residence properties are so located along the lines of manufacture and transportation that the employees may be gotten to

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and from their work without waste of time or inconvenience, and that the residence sections should be so segregated that their beauty and healthfulness can be fully worked out and conserved.

WALTER McCULLOH, *Consulting Engineer, Niagara Falls, New York*

The town planner thinks of the ideals of wide streets, curved lines, rolling grades and all those arrangements which make for beauty and attractiveness. The railroad planner thinks of tangents and profiles and endeavors to reach his objective with a minimum of curvature and a minimum of grades consistent with cost of construction and operation.

Both are right, but when the railroad is in the city and a change of location is desirable, these two planners must become allies not enemies. Neither the railroad nor the municipality whom they represent should resort to the "Steam Roller Method" of settlement of so important a question.

A review of the history of the railroad locations in New York and the New England states shows that the town was usually the first on the ground and the railroad, following the practice of economical location and with a desire to reach business, passed as near to the heart of things as was practicable, where its freight and passenger business might be handled with the least expenditure of money and effort on its part and where the business from the community might be easily secured.

The town grows around and close to the railroad until sooner or later its growth makes a plan for future development an absolute necessity. The city of Niagara Falls is no exception to the general rule and the railroad situation has become a very serious problem for all concerned.

The first railroad to enter Niagara Falls was operated by horse power and was nothing more than a tramway

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with one terminus at Lockport, where it connected with the Erie Canal, and its principal business was the transportation of goods and sightseers from the canal to the then village of Manchester, which had as its principal attraction the world-famous Niagara Falls. Then followed a railroad from Buffalo upon which steam locomotives were used, terminating on Main Street in front of the Cataract House. Some years later the New York Central Railroad and the Erie established their tracks on the present right of way. The Erie Railroad made Suspension Bridge its terminus, Suspension Bridge over the Niagara Gorge being one of the engineering wonders of its day.

For many years the local railroad business consisted in bringing tourists to Niagara Falls and handling the limited freight business of the manufacturing industries, such as sawmills, furniture factories and gristmills, which were then utilizing a very small portion of the available water power. These conditions continued until about the year 1890, when new life was injected into the community by the realization of the wonderful power possibilities and the improvement of hydro-electric machinery, making it feasible to utilize water from Niagara Falls under the full head of 200 feet.

In the year 1892 the city of Niagara Falls was created out of the two villages of Niagara Falls and Suspension Bridge and the unincorporated territory lying between and known as Clarksville. With the advent of larger power possibilities, the creation by the state of New York of a free park at Niagara and the incorporation of the city, the railroad situation became a most important factor in the development of the community. For some years previous the railroad traffic through Niagara Falls had been steadily increasing with the growth of Canadian business and the location of the Michigan Central line through the Canadian peninsula. There being no railroad bridge over the Niagara River

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except at Buffalo and Niagara Falls and no other crossing, a very large portion of the railroad business gathered at the two bridges at Suspension Bridge.

In approaching the subject of the railroad relocation problem in connection with the Niagara Falls city plan, we will refer to the map of the city and the surrounding territory, showing the present location of the several railroads entering the city, the location of the railway bridges and the proposed relocation of the lines. One sees at a glance that there are only two ways for the city of Niagara Falls to grow, namely, to the north and east; the Niagara River bounding the city on the south and west limits growth in those directions. The trunk-line roads entering Niagara Falls are: the New York Central, Michigan Central, Lehigh Valley and the Rome, Watertown and Ogdensburg; the Erie and Grand Trunk railways. The principal line of the New York Central for freight and passengers from the west and south of the Great Lakes enters from Buffalo through the heart of the city. Freight from east of Rochester enters over the Falls branch through Lockport to Suspension Bridge. Traffic from the north and along the south shore of Lake Ontario enters over the R. W. & O. to Suspension Bridge, and from Lewiston, connecting with the lake steamers, it enters over the single-track Lewiston branch. The Michigan Central from the west enters over the Cantilever Bridge and the Grand Trunk and Wabash and the Lehigh Canadian connections enter over the railway arch bridge, the successor to the old Suspension Bridge. In addition to the trunk-line railroads is the Niagara Junction Railroad, built some twenty-five years ago for the purpose of connecting all of these main lines with the manufacturing plants in the Niagara Falls Power Company's factory district. In addition to the steam roads there are two electric railroads entering the city from Buffalo which are practically parallel to the New York Central and Erie lines.

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Previous to 1895 the main local passenger business was bringing tourists to see Niagara Falls and taking shoppers to and from Buffalo, but as the greater power plans were realized and the extensive electro-chemical industries developed in this city the local freight business rapidly became of paramount importance, with the result that all of the railroads have increased their yards and tonnage, the line between Buffalo and Niagara Falls has been double-tracked as well as the Falls branch to Lockport and east. The Suspension gave way to a Steel Arch Bridge, and the Cantilever Bridge has been materially strengthened in order to meet the rapidly increasing loads of rolling stock and traffic passing through the city to or from Canada.

All of this development has been without any definite plan in view by the city with regard to proper zoning of the territory and without any attempt at regulating the railroad locations. The railroads and the city have grown along the lines of least resistance, with the result that unwittingly each has created for itself a vexing problem.

It would be difficult to find a more unique and complicated railroad situation than that which exists in the Suspension Bridge section of Niagara Falls, with all the tracks converging at the two bridges over Niagara River and with a large part of the traffic approaching at right angles to the lines of the bridges, requiring an unusual amount of switching and transferring of cars to get them in position to cross the river. Through this network of tracks, where all lines meet, the Main Street of the city crosses at grade. The vehicular and pedestrian traffic at this point is greatly interrupted by the many passing trains, and at best the crossing is a constant source of danger to the lives and property of the people who must use the street.

At the Falls Street station conditions are equally bad and dangerous, where Second, Third, Niagara and Main Streets cross the tracks at grade and where the passing

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of heavy freight and passenger trains and the constant switching of local freight, with the attending smoke and noise nuisance, has become intolerable in the heart of the business section and near one of the best residential sections of the city.

Street car lines from the southern to the northern and central parts of the city must all cross the New York Central tracks at the Second Street grade crossing. The constant passing of trains make the maintenance of trolley service schedules almost impossible, and this crossing is a standing nuisance and an ever present hazard to the thousands of trolley passengers who must pass over it daily.

Serious accidents have occurred on these crossings and more serious ones are liable to happen at any time, especially as the street traffic becomes heavier and the railroad traffic increases.

The long waits at the crossings while trains are standing at the station are the cause of much lost time to business and retard the free use of the streets by the citizens of the city. Out of this situation a strong feeling against the railroad has been growing month by month and the demand for a remedy is daily becoming more urgent.

Something must be done in the near future to remove these dangerous and annoying conditions, and in reaching a solution of the problem the city and the railroads must coöperate. The railroads must either change the location or eliminate the grade crossings. Either plan will require very extensive construction and involve heavy expenditure of money. A combination of the two plans of grade crossing elimination and relocation will in the writer's opinion be the final solution of the problem.

The possibility of relocation of the New York Central and Erie lines through the south and west portions of the city has been the subject of much study and many suggested plans during the past fifteen years. Four of these proposed plans will be discussed hereunder.

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Referring to the map and the tentative town plans prepared by Dr. Nolen, we find a suggested relocation for the railroads entering Niagara Falls from Buffalo, which contemplates a new line running parallel to Sugar Street, about two miles east of the present through line of the New York Central. Three of the other suggestions for relocating the railroads will be considered as typical possibilities.

1. The first proposition for a relocation was made about 1904 and was considered by the then city engineer and the railroads. A survey and estimate of cost was made by the railroad to determine the feasibility of the proposed line. This plan contemplated deflecting all through freight and passenger trains at La Salle four and one-half miles east of the Falls Street station, sending them over a line running to the northwest and connecting with the Falls branch near the northeast corner of the city, where the Niagara Junction Railway now joins that line. There would be a saving in distance of approximately one-half mile, and a complete elimination of the smoke and noise nuisance of the trains in the thickly settled parts of the city. The new line would pass through farming land with no serious grades to overcome and with few highway crossings to provide for. This line would also have the advantage of delivering the freight trains at the east end of the north distributing yards, where vacant land is available for yard expansion if desired.

Local passenger trains and local freight would follow the present line through the city to Suspension Bridge, but the dangerous grade crossings would still have to be separated sooner or later.

2. The second suggestion for relocation was made by the Niagara Falls grade crossing engineer about three years ago and contemplates continuing the New York Central and Erie tracks to Tenth Street near Buffalo Avenue, at which point both lines would be deflected to the north over the right of way of the Erie Railroad to the Sus-

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pension Bridge station. All traffic through the city would be run over this line, and the section of the New York Central from Tenth Street to the Falls Street station, and thence along the river bank to the north end, would be eliminated. A Union Station is contemplated in this plan at Eighth Street and East Falls Street, and the extension of Falls Street over the site of the present south-end freight yard and over the Hydraulic Power Canal would afford a proper and attractive approach to the new Union Station.

The present profile of the road would be changed by raising the grade at the south end and cutting down at the north, thus easing all of the grades of the present tracks and eliminating the street grade crossings.—Five of the streets crossing the Erie line at present have either been elevated or depressed to eliminate dangerous crossings. The remaining five principal streets would under the new plan pass over the depressed railroad tracks at the north end.

The saving in distance from the New York Central present line would be only about one thousand feet, but the saving in time and from annoyance to the public would be very great and the railroad would be taken out of the business district of town. Also the section of the river front on the high bank from the Hydraulic Power manufacturing development to Suspension Bridge would be made available for park or residential purposes, and no more attractive site could be selected for a park than along the top of the cliff within the above limits.

3. This proposed line is a part of the tentative plan prepared for the city by Dr. John Nolen and contemplates the diversion of all railroad traffic around the present built-up section of the city and through a section which is sparsely built at the present time.

This line deflects from the New York Central and Erie lines at Echota, two and one-quarter miles east of the Falls Street station, in the southeast portion of the city,

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and runs northerly parallel to Sugar Street to connect with the main lines at the north end at the Sugar Street overhead crossing. This line would be elevated for about one-half of its length and depressed for the remainder, with all grade crossings eliminated, and as the line passes through comparatively open country, new streets and avenues have been shown on the tentative town plan so as to eliminate as many street crossings as is feasible without too great an inconvenience to the traveling public. The saving in distance in this line from the point of deflection to the Suspension Bridge station, over the present route of the New York Central, would be nearly one mile, but there would be an operating disadvantage of entering the freight yard near its middle, and a part of the present trackage must be retained for local freight to the southern manufacturing and business districts.

Two stations are contemplated in this scheme: One at Echota, to accommodate the southern district of the city, and the other at the present Suspension Bridge depot for the north-end section and for through passenger service.

4. The fourth line for our consideration is one of several suggestions made by E. P. Goodrich, consulting engineer, and is the one which the writer understands Mr. Goodrich favored. This line deflects from the New York Central near 24th Street and Buffalo Avenue and runs northerly between 19th and 20th streets to the north-end yards, turning westerly to the Suspension Bridge station. The saving in distance in this line over the present New York Central location would be 6,000 feet, but the line passes through a rapidly growing section of the city, in which some of the blocks are already well filled with buildings, many of them of a permanent nature. The north end of this section has been developed into an attractive residential district. The acquisition of the right of way would be an expensive undertaking. In addition, most of the streets and avenues running east and west have been developed and improved, so that prac-

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tically every street would become a depressed or elevated crossing.

The plan contemplates a Union Station at Pine Avenue and 19th Street, a situation which would probably be near the center of population for some years to come. Two of the trolley lines pass this point at present and by enlargement would accommodate the traffic in all four directions.

The other lines proposed by Mr. Goodrich pass through this same section of the city and are modifications of the above described line by deflecting from the New York Central at different points to the east of 19th Street, but many of the same objections apply to these lines as to the one described.

The writer cannot at this time present to the Conference any definite figures as to the cost of the several relocation lines proposed, but in a general way has considered the advantages and disadvantages of each proposition.

There are certain features of the present railroad situation which must be considered in every proposition, namely, the existing location of the southern manufacturing district in the vicinity of the Niagara Power Company, the location of the manufacturing center around the Hydraulic Power Company's development and the location of the two bridges crossing the Niagara River. Provision must be made for the delivery of freight to all of these three sites, and local freight to the south-end business section must also be provided for. Hence there would be great objection on the part of the railroads and local manufacturing interests if any attempt were made to discontinue all of the present lines from the foot of Sugar Street at the south to Fall Street, and thence to Suspension Bridge. This leads to the conclusion that a compromise between ideal conditions desired and the present undesirable condition is the only solution of the problem which can be expected at present. Without

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complete data at hand proposition No. 2, being the use of the Erie Railroad right of way from Tenth Street to the north, appeals to the writer as very attractive, and he sees in it possibilities which lend themselves very readily to the proposed town plan. One feature is worthy of particular attention, namely, that a Union Station could be placed near the center of the present Erie freight yards just east of the proposed civic center at Pierce Avenue and Main Street. At this point the railroad tracks would be depressed and all of the streets pass overhead. There are possibilities here for the development of a most attractive Union Station, with park space in front and facing directly upon the civic center. Another attractive feature is that the through traffic for the bridges would be headed in the right direction and one principal station only would be required. The land now held by the New York Central under the tracks to be abandoned has a selling value to materially offset the cost of the new construction.

Surveys of the several lines and estimates of cost of construction and estimates of operating cost must be made before a definite decision on these points can be arrived at. The city and the railroads should get together at a round table for an unselfish discussion of the situation, so that there may be as little wasted time, energy and money as is possible in arriving at the much to be desired solution of a most perplexing problem.

NOULAN CAUCHON, *Consulting Engineer, Ottawa, Canada*

The fundamentals of organic planning for communities are:

First, to settle with finality the location of the steam railway,—on the path of least resistance,—that future expansion may be unhindered and free from necessity of revisions and reductions; that it may transport the maximum of people and of tonnage with the minimum of effort. This is the province of the railway engineer and economist,

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dealing with ruling grades and operating features to preserve and enhance community efficiency.

Civic authorities should nevertheless keep in mind that railway economics seek but the accomplishment of relative efficiency at minimum effort to the railway; that ultimate economics are the absolute efficiency of the community and may justly impose, on the exercise of franchise, conditions of safety and of amenity in the public interest. Instance particularly the safety of grade separations; the disposition of union passenger terminals where they best serve public convenience.

The second controlling feature of the organic city plan is the arterial highway and its ruling grades.

The advent of mechanical transport has brought the problem of highway haulage under the same principles, for economy and efficiency, as heretofore prevailed for the railways, and upon which railway grade reductions are figured and justified.

"The good roads" efficiency for motor trucking is the beginning of what may be termed the democratization of transportation — independence for the individual.

In this connection I have been advocating that cities should determine the best ruling grades attainable for their great arteries, within and without and beyond their boundaries to the relative scope of through haulage for district, province or state, for national and for international intercourse.

Further, that the "through" highway should be on an independent right of way like the steam railway, and likewise as free as possible from level crossing and sundry interruptions, if it is to maintain its logical purpose of speed and efficiency. Otherwise, the incidental limitations of local development will eventually defeat its basic purpose.

The highway ruling grade must be secured equally with that of the railway in all grade separations. It is in the light of the preceding that I have been advocating that

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the "through" highway from Niagara to Hamilton should be built along the side hill, about a hundred feet above the level of the valley, to give a comprehensive view of the fruit belt, facilitate grade separation and permit high speed. I am anxious that a welcome be afforded our United States brethren to visit us at the rate of forty miles an hour and realize what a magnificent country we have.

This view of the functions and requirements of the arterial highway should emphasize the importance and necessity of regional planning, as will be submitted to you by Mr. Adams, and the coördination that should prevail between regional and city planning that all activity should be planned to accomplish efficiency. If we are to obtain greater production to relieve our war debts we must, as I see it and have been urging upon our authorities for the last three years, go in for small holdings and intensive cultivation around cities, involving replanning of rural areas to better purpose and effect and that they may afford the amenities of civilized life.

The third basic requisite of organic planning is zoning, that is, determining the best use to which available area can be put, that planning may be to purpose. From this devolve the technicalities that insure sunlight and air; as regulations limiting the height, dimension and content of buildings in relation to the width and orientation of streets, the measure of faithfulness to which is as the birth rate and the death rate are to the rise or the fall of "Commercial Cannibalism" — the slum.

REGIONAL AND TOWN PLANNING

THOMAS ADAMS

Housing and Town Planning Adviser of the Canadian Government

A descriptive title for this paper might be, "The Regional Survey as the Basis for the Regional Plan, and the Regional Plan as the Basis for the Town Plan."

In order to plan our cities and towns properly, we must investigate and analyze many problems which have a bearing on life and growth within and surrounding them. What is true of the individual is still more true of the city. It cannot and does not live to itself alone. Recent events throughout the world have shown the extent to which the town and the country are interdependent. Recent tendencies in industrial decentralization have also shown the importance of one of the modern aspects of town planning, namely, the direction and control of the growth taking place within the rural and semi-rural districts where new industries are being established. The artificial boundaries of cities are becoming more and more meaningless. The real controlling factors which determine and encourage industrial growth are physical and natural to a greater extent than they are administrative and artificial.

One of the difficulties in dealing with this subject is that we have not yet adopted a clear and unambiguous terminology. The same words have different meanings to many of us. I must therefore begin by explaining what I mean by regional planning and regional survey, and I will take them in the logical order:

- 1. The regional survey has to do with the investigation and mapping of the existing physical, industrial and residential features of a region that has interests and

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problems in common, which need comprehensive and co-ordinated treatment without regard to arbitrary administrative boundaries.

2. The regional plan is concerned with the general planning of the area included in a regional survey. It is a skeleton and tentative plan of a region within which there is comprised a series of municipal units in juxtaposition to one another, and having overlapping and inter-related problems. The width, direction and classification of our main and secondary highways should be governed by the needs of such a region and not by the needs of one municipality within it. This principle is fully recognized in Ontario highway legislation in regard to the principle on which the cost of construction is apportioned. The planning of our system of communications in the regional plan should also have regard to the classification of land for different purposes of industry or residence. Land should be classified in a general way for industries, for residences and perhaps for agriculture, for park areas or for special reserves or as unsuitable for building purposes. We would also consider within the region how far it is desirable to prescribe a code of housing and town planning regulations to deal with building conditions that need to be dealt with in common over large areas of different character. Sewage and water supply may have to be dealt with in large regions to obtain efficient and economical schemes in cases where it is not practical to get an efficient system of either in separate units or administration. These and other problems that can be dealt with in a preliminary and general way need regional rather than municipal treatment.

3. The town plan is the definite plan, accompanying a definite piece of legislation, for fixing within the city or the country areas, first, those parts of a regional plan which are locally approved, and secondly, the civic design and regulation dealing more intimately and precisely with the problems connected with the growth of the town, its

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means of communication, its industrial development, its residential areas, its character and density of building, etc.

We thus have three distinct processes, each connected with one another and logically leading up to one another, which are the regional survey, the regional plan and the civic plan. It is unnecessary for me to argue with town planners how hopeless the task is to attempt to prepare a plan without having obtained accurate data regarding existing physical and industrial conditions.

We hear much of reconstruction. One of our greatest needs is to know what and how to reconstruct. In parts of Europe the work of reconstruction is simple and clear. It is a matter of rebuilding what has been destroyed by war. Here, reconstruction has to deal with involved human and economic problems with transition from disorder to order, with remedies for traffic confusion and with bad housing and wastefulness of resources. As an English writer recently said, "The monument which this war demands is the reconstruction of the material fabric of civilized life, its reconstruction upon a survey and a plan," and as Carlyle said long ago, the most effectual of all work of man is wise planning.

It is impossible in this brief paper to analyze the complex problems that need consideration in the regional survey and the regional plan. All that I can attempt to do is to present some of the reasons why they are necessary and to indicate some of the problems which they have to deal with. I claim that the nature of modern growth of communities, of the relation which exists between different elements in our community life, and the changes which are ever taking place in methods and conditions, impose upon us the obligation to deal with the regulation of growth on elastic principles over wide areas, and at greater expense of time and money than we have hitherto given to it. We must not only prepare our scheme by gradual steps but prepare them in such a way that gradual fulfillment will be obtained. While our ultimate objective must be clear

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in our minds, we must be content to work towards it by successive steps instead of jumping to the concluding stages without adequate measures of preparation.

The Niagara district seems to me to be one which needs the making of a regional survey and a regional plan as a preliminary to a series of civic plans for its city, town and county areas. Neither Buffalo, nor the Tonawandas nor Niagara Falls are strategic centers. They are parts of a strategic center of 1,000 square miles in extent on both sides of the Niagara River. The problems of this region are international, and give us proof that the power of natural conditions is so great that even the boundaries of nations do not form intelligent and appropriate boundaries to regional and town planning schemes. Indeed, may we not hope that in the process of planning them we will help to knit these two nations, their industries and people, closer together; and also that the bridge which we propose to erect as a symbol of peace will be more than that—will be a symbol of coöperation and mutual respect. Personally I should like to see something more than a physical bond; such a bond as could be provided by a Regional Planning Commission representative of the state of New York and the province of Ontario, to deal with the planning problems of the Niagara district. That need not be an idle dream any more than the creation of an International Waterways Commission.

THE PROBLEM OF GREATER LONDON

Some of the regional problems that have to be dealt with in the area surrounding the city in which we are now met are not unlike those of the metropolitan district of London, England. The difficulties of securing international and local coöperation in this region could not be greater than that of linking the hundred and thirty-seven local authorities of London into one conference to deal with their regional problems.

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In 1913-14 I acted as government representative on a conference of local authorities in Greater London. This conference was representative of one hundred and seventeen municipalities within and twenty municipalities outside the metropolitan area. The total area represented by members of the conference comprised 1,083 square miles, or 693,120 acres.

The population in 1911 was over seven and one-half millions and was increasing rapidly. One of the facts which we ascertained was, that whereas the population within the county of London had fallen off to the extent of 0.3 per cent in the ten years ending 1911, in the outer fringes of the metropolitan area it had increased 33.5 per cent in the same period. This rapidity of decentralization of city populations is becoming nearly as great in this country. It is a tendency which is bound to grow, as the economic factors and traffic conditions are all in its favor and it creates very difficult and complex problems of planning and administration. It is one of the tendencies which are lowering land values in big cities.

The London conference had terms of reference given to it by the government. It had to consider and report on means of communication and on town planning schemes within the area of Greater London. For two or three years representatives of these one hundred and thirty-seven authorities met regularly, and they finally brought in definite recommendations. The area was divided into six sections, and six sectional conferences sat at intervals, and only came together in the conference when they had to consider problems which affected them in common. In the reports of the Royal Commission on London Traffic and of the London Traffic Board of Trade they had a partial regional survey as the basis for their plans.

In our countries we have not yet fully realized the enormous waste which is caused by the want of planning, because we have not yet arrived at the point where we are made to pay the penalty for past neglect. In London

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alone about \$55,000,000 was spent in street improvements between 1889 and 1911, the cost of the improvement scheme working out at \$1,400,000 per mile.

Looking back to the year 1914, when I assisted in organizing these conferences, I can see more clearly now that some of the most serious difficulties we had to encounter were due to the absence of having in advance a more comprehensive regional survey than we had; a survey dealing with industries, housing, and general social conditions. We were, however, provided in England with topographical maps on a large enough scale and of sufficient accuracy for all purposes.

OTHER ENGLISH SCHEMES

No cities in England may be regarded as more distinctively commercial or industrial than Birmingham, Sheffield and Glasgow. These cities, particularly Birmingham and Sheffield, have been working for many years on town planning schemes. Birmingham is the most advanced city in the old country in regard to town planning. It has only been possible, however, to prepare proper schemes for that city by reason of the taking within the city boundaries of immense areas of the surrounding territory, until today it has one of the largest city areas in England. Outside of this huge area there is a large industrial region stretching for twelve miles and inhabited by several hundreds of thousands of people. The municipalities of this region are associated together for the purpose of considering their common problems, but are still making little headway because they do not realize the necessity of preparing the regional survey and plan.

Sheffield has a large area of over twenty-four thousand acres for a population of less than half a million and the greater part of this area is agricultural land. It also has been preparing town planning schemes since 1909, and

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latterly its citizens have come to the conclusion that it must lay the foundations for future planning by making a regional survey. In this work the Development Committee of Sheffield, a body corresponding to a Chamber of Commerce in this country, has retained Professor Abercrombie, of the School of Civic Design in Liverpool, to assist in making the survey and preparing a general plan of development.

In the Clyde Valley in Scotland, as in the territory surrounding Birmingham, there are numerous satellite cities and towns which need to be planned in broad outline as a whole, as a preliminary to the preparation of local schemes.

THE NIAGARA REGION

From these British examples I now turn to a consideration of the conditions and problems of the Niagara region.

Superficial study of the problems which need to be dealt with within the Niagara region has convinced me that the whole district for at least twenty miles on either side of the Niagara River needed to be made the subject of a regional survey. The Niagara district is one with enormous potentialities for future commercial development. It has a strategic position of great importance to both our countries, and it has certain advantages as a tourist center which are sufficiently in conflict with the aims of those who are interested in its industrial expansion to make it important that a survey be made before any very definite plans are adopted by any municipality within the district.

Having arrived at the above view, I have with the aid of one of our town planning engineers, Mr. H. L. Seymour, collected data to assist in ascertaining whether a survey was desirable, and whether there was a case for preparing a skeleton plan of the whole territory anterior to the preparation of separate town planning schemes, and

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further, whether coöperative action was not required to get the best results for the different communities in the district.

AREA AND POPULATION OF NIAGARA DISTRICT

What I call the Niagara district comprises approximately twenty miles on either side of the Niagara River for a length of twenty-eight miles between Lakes Erie and Ontario. Further west on Canadian territory another regional area has the city of Hamilton for its center. In the United States the area covers all the county of Niagara with the exception of the towns of Somerset, Hartland and Royalton, and in the county of Erie includes the towns of Tonawanda, Amherst, Clarence, Cheektowaga, Lancaster, West Seneca and Grand Island. The total area is over 700,000 acres, or about the same area as that of the metropolitan district of London, of which about 317,000 acres are in Canada and 418,000 acres are in the United States.

The present population is estimated at about 751,600, made up of 86,700 on the Canadian side and 606,900 in the United States. Buffalo is not the geographical center of the region, although it is the predominant partner among the local units by reason of its size. Further consideration might lead men to include more of the southern environs of Buffalo to a distance of ten miles from its center.

Including all towns of less than seven thousand population, the rural population on either side of the border is about directly proportionate to the rural area, being about one person for a little less than seven acres on the Canadian side, and one person for a little over six acres in the United States. The densities of Lockport and the Tonawandas are very low, being only about 4.5 persons and 2.7 persons respectively per acre. Mr. Nolen states that American cities of 50,000 population have an aver-

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age density of 5.6 persons per acre (average of 25 cities, United States Census for 1916), and that cities of 100,000 population (average 20 cities) have an average density of 7.6 persons per acre. These figures indicate how widely dispersed the population is in the cities in spite of congestion in parts and reveal how wasteful and inefficient are our methods of industrial and civic development.

On the diagram a curve is shown of the total estimated population in 1950; the estimate gives 1,170,000 for the Niagara Frontier regional area at that date. It has been considered that the rural population would remain unchanged, and the estimate has been based on future growth curves of the combined total of three Canadian cities in the region and six of the regional cities in the United States.

A study of conditions shows that cities are growing along the Niagara frontier and the Welland Canal, so that their boundaries are being forced out to meet the smaller towns. For example, La Salle is now really a residential part of Niagara Falls, N. Y., but Niagara Falls has no control over its development, although the boundaries of these two places are now adjacent. Consolidation is considered desirable in these places as well as in St. Catharines, Meriton and Thorold; Lancaster and Depew, partly industrial and partly residential, have similar problems; Bridgeburg and Fort Erie, Port Colborne and Humberstone, are other cases in point. Then there is the larger question of what areas will soon be incorporated in the city of Buffalo. Evidently there is great need for some definite control over suburban areas, or, looking further into the future, areas that are to become suburban areas, and eventually urban areas. In this connection it is of interest to note that some of the leading citizens of La Salle have had a state law enacted giving that village the power to impose building restrictions.

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TOPOGRAPHICAL MAPS

The regional maps available for the Canadian side are small in scale, being one inch to the mile, but they have an advantage of being of recent date. Similar maps are being prepared by the Geological Survey of the United States. The contour intervals of the Canadian maps is 25 feet, and of the United States maps 20 feet. The maps are said to give comparatively accurate contour information. It is needless to say, however, that for town planning purposes larger scale maps are necessary. It has been suggested that maps should be prepared on a scale of 1 in 1,000 and probably 1 in 2,400 would be sufficient if any material saving could be effected by making the map of the reduced scale.

While some may question whether the expense of preparing such maps could be justified, we should bear in mind that there is need for employing professional men as part of our reconstruction policy in both countries, and that we are wasting large sums of money on making good roads and in allowing our cities to grow without proper plans, far in excess of anything we would spend on securing topographical maps of adequate scale.

The fact that the land is comparatively flat does not make the need for maps less important. The urban growth and industrial expansion within the area is such as to require proper maps to show the character and extent of the growth. Drainage is most difficult in level country and a good contour map would be useful in this connection.

During the time that I have been in Canada preparing town planning schemes the greatest want that I have experienced has been the absence of topographical maps of sufficient scale and accuracy to provide a good foundation for the preparation of such schemes. The ordinance maps available in England are of immense value, out of all proportion to their cost. It is probable that a good topo-

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graphical map on a sufficient scale could be prepared for the region under review at a cost of \$1.50 an acre or at approximately \$1,000,000 for the whole area. Of this sum \$625,000 would have to be spent in the United States and \$475,000 in Canada.

We have large scale maps for most of our cities, but they are mostly inaccurate and inadequate. In the majority of cases they consist of a series of subdivision plans fitted together, and have little regard to existing physical features. So far as they show subdivided areas which are not graded and improved, much less not built upon, they are useless and misleading for most purposes.

PURPOSES AND PRINCIPLES IN REGIONAL AND TOWN PLANNING

For what purposes do we require more accurate information and what are the usual problem that have to be dealt with in planning a large region? We may summarize these purposes and problems as follows:

1. *Industrial Development*—including the arrangement and classification of all lands and the location and distribution of manufacturing plants.
2. *Economic use and regulation of the subdivision of land* and the character and density of structures in rural and urban areas.
3. *Housing*—sanitation, convenience and amenity.
4. *Transportation*—railways, highways and waterways.
5. *Sources and distribution of power.*
6. *Water supplies and sewerage.*
7. *General amenities*—including parks and boulevards and development of tourist facilities.

In regard to these problems a few general principles may be restated.

The magnitude of these problems, when dealt with

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together, is not a reason for continuing to deal with them in a piecemeal fashion, as the price of failing to apply scientific methods is so great that any reasonable effort or expense to avoid its payment will be justified.

No city planning scheme can be satisfactory which is not prepared with due regard to the regional development surrounding the city, and no purely local plan of means of communication by rail or road can be adequate and efficient. The skeleton plan of the region should come first, followed by a series of city and town planning schemes, and both must be preceded by the regional survey.

There must be coöperation between the municipalities in the work of preparing the regional survey and plan, and coöperation between the municipal councils, the heads of industries and the owners of real estate in working out the city or town plan. The regional plan must be tentative and elastic, while the city and town plan must include only the things that can and should be enforced by law, making allowance for elasticity and modification in accordance with conditions specified in the schemes.

In the regional plan we have to consider, *inter alia*, the regional aspects of districting or classification of zones; the application of minimum standards of a housing code below which standards no local authority should be permitted to go; the planning of main arterial highways either between populated centers or radiating from them into rural areas or forming circumferential roads connecting the principal radii; the relation between railways and highways and between industries and all means of communication; the conservation and distribution of power; and the preservation of general amenities.

In the city or town plan we have more intimate local problems and have to deal with questions relating to character, height and use of building in areas of different kinds

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and situation, and in relation to varied widths of streets; planning of areas intervening between main highways or likely to undergo reconstruction; definite zoning of manufacturing, residential and park purposes and fixing of varied width of street to suit these purposes, local regulations as to apportionment of cost for different classes of streets, etc.

I will now proceed to consider some more principles in relation to the problems of the Niagara district, under the following seven headings:

INDUSTRIAL DEVELOPMENT

In the Niagara district the varied character of the soil and its great fertility in the rich valleys makes it of special importance that the system of distribution should be of the best kind to encourage the maximum of agricultural production. Being an old settled region it is probably impracticable to carry out any scheme of re-planning or reclassification of the lands. It is in connection with the growth of manufacturing industries that the chief problems occur. The combination of cheap power, adequate transportation facilities, and reasonably priced land are having their effect in promoting rapid manufacturing development in the region. As an example, the town of Welland, which had only five factories five years ago, now has thirty. In the cities and towns on the Canadian side there are one hundred and forty-five manufacturing establishments; on the United States side one hundred and eighty-three outside of Buffalo. The manufacture of cereal foods and the canning and preservation of fruits and vegetables are carried on side by side with the manufacture of aluminum, calcium carbide, etc. Too little regard has been paid even in recent years to regulating the location of objectionable industries and great and perhaps unnecessary injury has been caused to the asset of scenic beauty possessed by Niagara Falls. The need for zoning is evident to the casual observer; the methods

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of carrying it out require prolonged study so as to avoid injury to industrial development.

The low-lying land to the north or the escarpment on the higher land is excellent soil and well suited for fruit farming. The balance of the region is only at Lake Erie level, and represents some drainage problems, especially in the clay strip that runs through the center of the region. On the Canadian side near Lake Erie shallow soil is also encountered, with limestone outcropping near the surface, and peat bogs are also encountered.

Generally speaking, the level area which is given up to dairying and general farming has not been developed up to the possibilities of the soil. One reason advanced is that the original settlers were military pensioners, after the war of 1812, who managed to get along on their pensions without doing very much to develop their farms. The descendants of these early settlers find in the summer tourists, and in the various engineering works being carried on, opportunities to sell garden stuff, etc., and to do work with their teams that seems to make a good return, but as a matter of fact the farms are badly neglected, and the net result is not a good one for the region.

Recently 2,000 acres of land were purchased on Grand Island by a realty company. The river frontage is to be sold for cottage sites, while the remainder is being subdivided into tracts of one acre or more. These are to be planted with fruit trees. The little orchard tracts are then to be "marketed on small payment plan to enable the family of average income to invest in income producing property." As Grand Island seems to be part of the area which has not been successfully developed in the past, this new development would seem to be welcome, but its planning should not be left to the fancies and interested policies of real estate operators.

As in all unplanned cities the chief weakness of the urban subdivisions is the scattered occupation of suburbs

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and rural districts just over the boundaries of the cities and the unregulated machine of factories, business premises and residences.

HOUSING SITUATION

Generally speaking, no protection is afforded to residential areas, as the regioning and sanitary conditions are defective in districts occupied by working mens' families. There is an estimated shortage in the cities, not including Buffalo in the region, of about 2,350 houses. Taking the figure of 2,350 as the shortage in houses and an estimated population of 168,000, it will be found that for every seventy people there is another house needed.

On the Canadian side the larger cities and towns are proposing to take advantage of the Ontario Housing Act. In Welland last year a local syndicate was formed to build a number of working mens' houses and some thirty of these were completed.

On the United States side of the river there seems to be great shortage at the city of Niagara Falls. The United States Housing Corporation have nearly completed developments for some two hundred families at a cost which will be nearly \$4,000 per family. At the rents to be charged it is stated that 4 per cent of the cost will have to be written off. Most of the development is group houses and the rents run up to \$25.

At Lockport the gravity of the situation was realized as early as 1917. The Lockport Homes Company was organized by representative citizens and the result is a total of eighty-eight homes completed and occupied. These are all single house dwellings and make attractive, cozy homes. The selling price of each property is just about what one would now pay in Canada for the house alone.

Housing is receiving the attention now of the various chambers of commerce and at Niagara Falls steps are

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being taken to put into effect a proposal to establish a housing corporation which will help to finance the erection of dwellings in that city. Generally speaking, rents are considered to be much too high. At Tonawanda the opposite is said to be true, and rents are not sufficient to encourage any kind of building. There the various industrial corporations are considering the question of housing their employees. At Depew and Lancaster the blame for the housing shortage is laid to large corporations holding land out of use.

The increase of rentals seems to be considerably greater in the United States than in Canada.

I am informed that 50-foot lots for housing cost from \$300 to \$400 on the Canadian side, and from \$800 to \$1,500 on the American side. This brings the value of land on both sides in approximate ratio to the population. More investigation is needed to ascertain the proposition of local improvements included in this cost.

A survey of housing conditions is needed, not only to ascertain facts with regard to the shortage, but also to find out the best means of raising the standards of existing dwellings and improving sanitary conditions.

RAILWAY SITUATION

The diagram lettered "B" illustrates the numerous railways that serve this area, making it a railway center, and perhaps unrivalled for rail transportation facilities. Gardenville gravity freight yards, near Depew, are indicated. Here some \$25,000,000 is to be spent, and the yards completed in the next ten years, \$6,000,000 already having been appropriated. Mr. Seymour reports that he was informed that the yard will be one hundred tracks wide and will serve some thirty railway lines.

At the Lake Erie end of the region there is only one railway bridge, and that single-tracked. Trains are said to cross at the rate of one about every seven minutes, and

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there are fifteen thousand cars of merchandise passing through every month. The Canadian Pacific Railway may consider it desirable to build bridges at Goat Island to cross the Niagara River and give them their own bridge entrance into Buffalo.

As far as the cities and towns are concerned, the greatest problem is that of grade separation. In this matter the railways have had the upper hand in the past, and it is true that the general interests of the public were safeguarded in connection with railway enterprises to a greater extent than hitherto. But it is not the railway corporations that are to blame; the fault lies within the local authorities in not taking action in time. Portions of Niagara Falls, Ontario, and Niagara Falls, N. Y., are practically devoted to switching, and this right on some of the busy streets. For example, in Niagara Falls, Ontario, there are fourteen level crossings.

It would be an advantage to have the tracks of the electric radial railways moved from the central streets of the cities and towns in certain cases. In other cases, streets are too narrow for double tracking.

HIGHWAYS

A glance at the accompanying diagram indicates how well the region on the United States side is served with first-class hard surface roads, and how poorly the Canadian side is served in this respect.

There is no need to advance arguments here for good roads, and it is evident that one of the greatest problems of the area on the Canadian side is that of improvement in the highway system, but the roads should be classified and planned in a comprehensive scheme before being improved.

In 1890 the state of New York voted \$50,000,000 for highway improvement and a certain amount of haphazard development occurred. Later the amount was increased

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to \$100,000,000, and a highway system was definitely planned, with due regard to traffic and probably with some regard to topography; but in the absence of a regional survey and plan many of the factors which are necessary to procure a good plan of a highway system must have been unknown.

Federal and state or provincial aid is now being granted the United States and Canada towards the construction of good roads.

Even a preliminary survey of conditions on the Canadian side across from Buffalo would seem to indicate that that area is being hampered in its development by the lack of a highway bridge. A "Peace" bridge has been proposed as a War Memorial, and it is stated that bills are before the governor of the state of New York, one for a bridge at Buffalo, and one for a bridge at Niagara Falls. Apart from the question of the Peace Bridge there is no doubt as to the need for a bridge at Buffalo across the Niagara River, but the means of communication on both sides of the river need to be studied before the site of the bridge is settled.

WATERWAYS

The Niagara River as a waterway between Lakes Erie and Ontario is of course impossible for navigation. On the Canadian side the Welland Canal provides a waterway between the lakes. The following report has been submitted to me with regard to the Welland and Erie canals:

"The earliest Welland Canal was constructed about 1820. The route was from Chippewa on the Niagara River, up the Welland River to Port Robinson, and thence by canal to Port Dalhousie. This canal had forty locks with only a depth of six feet over the lock sills. For its development it was found necessary to construct a

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feeder canal from the Grand River near Dunnville, the Grand River being dammed at this point. In 1836 the canal was completed from Port Robinson to Port Colborne on Lake Erie, the feeder becoming no longer necessary for canal purposes. In 1860 the new Welland Canal was constructed, providing for boats with a draft of 14 feet. In 1914, operations on the Welland Ship Canal were commenced, and although discontinued for a time, construction is now again being proceeded with. Before the war the total cost of the canal improvements was estimated at \$50,000,000. The canal depth will be generally 25 feet, but 30 feet has been provided over the lock sills — a case of intelligent planning for future development.

A part of the Welland River is now used as part of the Welland Ship Canal system. This will result in the flooding of land and in the pollution of the canal water now used as the water supply for towns along the Welland Canal. This introduces the problem of water supply, and it has been practically decided to construct a pipe line from Lake Erie to Lake Ontario along the canal route. The effect of the new canal will be to allow hundreds of ships in the upper lakes to reach Lake Ontario, if they so desire. Grain can be taken in large quantities through the canal to Montreal, and it will enable coal, coke and ore to be shipped to Welland. At present there are no docks at St. Catherines on the canal, but this portion of the old canal is to be left and become in effect a water siding, and should be an advantage rather than a detriment to St. Catherines.

The old Erie Canal, which is part of the old system from Buffalo to New York joining the Hudson River at Troy, was completed about 1825, and allowed vessels with a draft of only 4 feet. In 1848, it was deepened to 7 feet and in 1870 the locks were enlarged. From 1906 to the present the old Erie Canal has been generally improved, the depth over lock sills being now 12 feet and the old towpath done away with. It is understood that

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over \$150,000,000 has been expended on various improvements. The old Erie Canal route remains practically unchanged, and is a tribute to the engineering work carried out in the early days. As towing is no longer necessary, the canal along the Niagara River from Tonawanda to Buffalo is practically abandoned, the vessels taking the river course. Suggestion has been made that this old part of the canal be used as a drain for sewage from Buffalo.

While the Welland Canal even now takes ocean-going vessels, it will be much better suited for that traffic in the future. The Erie Canal remains still a barge canal (it has in the past, however, and will to a great extent in the future, no doubt, carry a great deal of traffic, especially grain and lumber). Buffalo is one of the largest ports on the Great Lakes, and the canal improvements cannot but improve its position as regards shipping. From Port Colborne across Lake Erie a car-ferry has been suggested to bring coal and coke to Canada.

Power is developed on the old Welland Canal at Thorold, Merriton and St. Catherine on account of the fall provided by the escarpment, and similarly at Lockport on the Erie Canal.

The great improvement which is taking place in regard to the waterways which feed the district will be certain greatly to increase the population and industries of the region in the near future, and they will also tend to create changes in regard to local conditions of development and settlement of land. A regional survey and plan is needed to deal with this expected growth and change of conditions even if no other development of transportation facilities were taking place. It is also important, as we shall see later, to consider the park system of the region, and perhaps the drainage system also, in connection with the abandonment of old waterways.

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POWER SITUATION

I am indebted to my assistant, Mr. H. L. Seymour, and Mr. G. H. Ferguson for data regarding the power situation at Niagara Falls. The rapidity with which the demand for electrical energy has grown is indicated by the fact that the first modern power development at Niagara Falls took place in 1890, with an initial installation providing for the production of 100,000 horse power. At Power Glen, adjacent to St. Catharines, there is also a development of some 52,000 horse power. There is also under construction plants to produce an additional 400,000 horse power. The principal development is that of the Hydro-Electric Power Commission of Ontario, which is constructing a canal eight and one-half miles long to divert the flow of 10,000 second feet of water and provide for the alternate development of 300,000 horse power at Queenston. This enterprise will cost \$25,000,000 and will not be completed till 1921.

There has been some criticism of the construction of the open cut, which is having an injurious effect on adjacent property and will make the city of Niagara Falls, Ontario, an island. Whether this criticism is justified or not, and whether part of the canal should have been in tunnel, as apparently would have been practical, does not concern us, but the fact that it is made shows that no such scheme should be carried out without careful study of all the factors, including those outside the purview of the hydro-electric engineers, before this kind of enterprise is begun. The day should be past when great corporations, whether railway or power companies, should be permitted to ignore the effects of their enterprises or the industries, property and lives of the community as a whole.

It is estimated that in addition to the 1,025,000 horse power now developed or in course of development, another 1,500,000 horse power can be developed without impair-

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ing the natural beauty of the Falls. The Hydro-Electric Commission of Ontario supplies 120 cities and towns with a population of over one million people with light and power. This extension in the area of distribution is one of the factors which show the need for a regional survey and plan.

WATER SUPPLY AND SEWAGE DISPOSAL

Lake Erie is the source of water supply for the urban population in this region, either via the Welland Canal or the Niagara River. There is pollution of the Niagara River, practically none of the cities or towns treating their sewage. This pollution will be increased with the completion of the Welland Ship Canal and the entrance of the water from the Welland River into the system. It has been decided to have a pipe line extending from Lake Erie to Lake Ontario to supply the cities and towns along the Welland Canal with water.

The pollution of the Niagara River has been a matter of consideration for the International Joint Commission, and recommendations have been made by their engineers. Evidently the situation needs early attention.

The Tonawandas Chamber of Commerce is considering a scheme for sewage disposal for their whole area. Mr. F. W. Barrally, city engineer of Tonawanda, has done some preliminary work on this scheme, which it is claimed provides for sewage disposal, and drainage of the outlying area along the Niagara River and incidentally for the development of power. It would avoid the very serious pollution of the Niagara River and would use the old Erie Canal as a drainage canal for sewage from Buffalo to Tonawanda. There is urgent need for study of the sewage disposal problem of the whole district so as to get an economic and efficient system.

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PARKS AND TOURISTS

Both the rural and the urban areas seem to be deficient in parks. It might almost be stated that the cities and towns have no parks. For example, I am informed that the city of Lockport, with a population of 20,000, has only a park area of twenty acres, although the total area is seven square miles.

A park reservation of upwards of 66 feet has been made all along the Niagara River on the Canadian side. This reservation should have been wider. In the United States they have not made that mistake. They have not made any reservation.

Suggestions have been made on the Canadian side that the areas around the old and new Welland Canal system be parked and the boulevard system then carried out. In the United States Mr. Nolen has suggested as worthy of consideration the reserving of areas for country parks in the old Tuscarora Indian Reserve and on Grand Island.

An estimate has been made that from 1886 to 1907, 15,000,000 visitors have viewed Niagara Falls. In spite of all that has been done it cannot be said that sufficient care and vigilance have been taken to preserve the remarkable scenic beauties of this region, or to regulate industrial development so as to prevent injury to the amenities of the district with loss of convenience or efficiency. The commercial value alone of the great combination of national and historic features is such as to justify the expenditure of more money and effort in conserving them. At old Niagara, with its large "Commons," there are points of historic interest, and the ruins at Fort Erie at the southerly end of a possible park system should also be preserved.

But it is a regional and not a local problem. The district has been endowed by nature with exceptional gifts, extensively as well as intensively. People should be at-

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tracted here to spend days instead of hours. All these matters I have referred to create one big problem that requires big men to solve it and raise it above the level of the policies of the village pump. I have merely tried in this paper to show that the problem exists and the general steps that need to be taken to deal with it. The whole question of the development of this region in all of its ramifications is big enough to be dealt with internationally. As an immediate practical measure I suggest that a permanent conference or joint town planning commission of representatives of all the municipalities in the region be created to prepare a regional survey and a general plan for the area; that federal, state and provincial aid be invited towards the preparation and carrying out of a comprehensive scheme. This need not be done in any way that is unconstitutional or that interferes with local authority. It need not involve that any municipality now engaged in preparing its own scheme suspend its operations, but merely that it recognize that it is only part of a greater whole and that whatever it does should be made to fit in with a general plan of the region.

Apart from all other considerations, would it not be a good thing for our two countries to be definitely linked together in a work which is so much needed and has as much promise and opportunity?

Examples of partial regional planning are to be found in the United States as in the metropolitan region of Boston, in the proposals to deal with Greater Pittsburgh, in some of the schemes of Warren H. Manning, who has ever had a sound outlook on this question and in the proposed county-planning legislation of Wisconsin.

Regional planning schemes are being promoted in a number of centers in Canada. Our town planning legislation is really regional planning legislation. The Halifax group of schemes being prepared by the city and county authorities in coöperation with one another, deals with the whole of the region tributary to that city that is

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likely to be affected by urban growth. It is hoped to bring the whole of Nova Scotia under town planning regulations in the next three years by mandatory legislation. The St. John scheme covers 20,000 acres, of which more is in the country than in the city. It is a regional scheme, and lays down definite rules and not merely tentative proposals to govern future development. It has been formally approved by the municipalities. The schemes for Calgary and other Alberta cities will be in effect regional schemes, as they will prescribe the conditions of development of the agricultural belts round the urban areas.

The coöperative action of the local authorities in these cases is only being obtained because of the assistance and guidance given by the Housing and Town Planning Branch of the Federal Government — acting through and in complete harmony with the provinces.

What we are aiming at in all our housing and town planning administration in Canada is to give reality to federal, provincial and municipal coöperation, and as we stress that, I can see the home-rule bogey vanishing into nothingness. That bogey has never existed because of the guiding hand of the state, or the intelligent and skilled directions of state bureaus; it is the creation of the petty-fogging interference of provincial and state politicians whose restrictive measures are designed to cover their ignorance and not to promote principles of general well-being. Home rule in its extreme form is the Bolshevik reaction to state autocracy; and the antidote to both is to be found in the same middle course of mandatory coöperation between all groups of government backed up by skilled executive departments in the provinces and states and trained managers in the municipalities.

By coöperative action we can get all the regional planning that is needed. It will not endanger but will rather strengthen the case for effective and reasonable home rule.

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Proper measures of regional planning will enable us to regulate and organize the development of new industrial communities, thereby helping to break down the necessity for one-industry towns. We cannot stop the dispersal of industries into rural areas, but we can assist in planning and directing them in the right way. One of the mistakes which seems to be prevalent in modern life, even among members of this conference, is to use the errors of the past as an excuse for committing the still greater error of doing nothing. In the degree in which we resist that fatal philosophy we will show ourselves worthy of the trust given to us by our heroic dead.

REGIONAL PLANNING IN MOTION

W. J. DONALD

Secretary Niagara Falls Chamber of Commerce

It cannot be gainsaid that the present deplorable condition of the residential sections in the modern industrial areas, especially in America, is due largely to the excessively individualistic character of their development. Towns and their surroundings are the expression of something in the lives of those who build them. Raymond Unwin, in his "Town Planning in Practice," points out how towns have been too much mere aggregations of struggling units having little orderly relationship one with the other and little of orderly life, and how this condition naturally expresses itself in the development of cities and industrial regions. If this is true in Europe, how much more is it true in America. If it has been true of American cities, how much more has it been true of states and provinces and of industrial or agricultural regions.

Contrast with this the definite relationship which existed between the different classes and individuals of society, which expressed itself in the character of the villages, towns and regions of feudal days. To be sure, this state of order, which with a little imagination one might characterize as regional planning, was despotic in its origin, and it may not have been consciously established. The orderly and somewhat monumental distinction of some European cities may have been entirely a spontaneous expression of the relation of the people to the domination of the feudal system. Whatever the cause, however, one may readily observe that the growth of democracy for a time at least left the individuals in a

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state of aimless freedom which unfortunately became an institution that has been hard to remove despite its unsound foundation.

Today, however, we recognize the rights and powers of the community as distinct from the rights and license of the individual. Theoretically at least we acknowledge restraints under which we voluntarily agree to live and work. Practically we have reconciled ourselves to many forms of social control with the thought that the authority to which we submit is our own rather than despotic. Conscious town planning, town planning legislation, building codes, zoning ordinances, and the growth of state and provincial control of intermunicipal problems are some of the evidences of the gradual emergence of community rights.

The growth of commercial and industrial towns and the coördinate growth of the national consciousness conspired to dethrone feudalism and to make modern industrial and commercial life, and at the same time to destroy the artistic promise of feudal cities. The distinctiveness of regions disappeared. Building materials lost their local color as transportation grew cheap. Railways at a late date intensified the cheapness of transportation and incidentally brought community problems all their own.

We are all aware of the corresponding thought revolution which industry and commerce brought in their wake. Having destroyed the old feudal processes of planning cities and regions, they ultimately added extreme individualism in thought and license in action to the injury already done. But there was no return. Nationalism forged ahead, first by substituting national control for regional development and later by adopting *laissez faire* in national as well as local affairs. Meanwhile cities and their regions were given little or no constructive thought, with what results we all know.

From an extreme policy of noninterference one of the first reactions was the movement toward municipal home

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rule, with which regional planning seems at least to come into conflict. Now "home rule" is a term that has several popular meanings and has several stages of development. Some of these meanings imply conflict with the regional idea; some of them, if carried to their logical conclusion, support it.

In some quarters and at some periods it stands for a transfer of administrative and legislative powers to the local community. This demand naturally arose as soon as local problems became sufficiently important to justify the transfer. That it was a serious issue in cases is amply proven by the story of the growth of municipal government in Ontario. Essentially, however, it was a demand for a transfer of powers that were being exercised by the state or provinces in a manner both arbitrary and unnecessary. This privilege of local self-government is without question highly prized and to my mind properly so. Within limits it will not be relinquished, and he would be a daring leader of doubtful statesmanship who would suggest its curtailment in its essential features.

The second form of demand for home rule arose from subsequent legislation passed by states and provinces to curb the activities of municipalities which had been granted a freedom of power which they used too much but not well. Students of municipal government are aware of the errors which Ontario municipalities made in the 'forties by borrowing too freely from the province for railway and canal subsidies. The canal evil was particularly prevalent in New York state. This condition was met in Ontario by legislative curtailment of the powers of municipalities and in New York state even by constitutional prohibition. The constitutional prohibition of subsidies to canal companies and the limitation of the powers of cities to embark on municipal housing or other ventures are examples of such restrictions. To be sure, many of these were in part self-imposed by municipalities which feared to entrust their elected authorities with unlimited

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power and which applied for charters containing limiting clauses. Such charters and state laws and constitutions still exist, but in recent years the home rule movement has been heavily flavored by efforts to abolish these limitations on municipal powers. This was a movement away from extreme individualism and carried to its logical conclusion helps to justify regional planning as well as purely local control.

A kindred form of home rule movement appears in the effort of municipalities to secure powers which have neither been prohibited specifically, nor authorized either definitely or by implication. It is scarcely necessary to recall that municipalities are corporations with powers delegated by states and provinces and limited directly or by implication by the charters they receive or general laws under which they organize. Until recently and even now many states and provinces made no special provision for town planning, and in practically all states and provinces the legislative provision is still inadequate. Unqualifiedly municipalities should have the power to develop their lands and resources intelligently and without unnecessary handicap. The lack of adequate planning legislation is an excellent illustration of inadequate home rule. There is, however, no essential conflict between this idea and regional planning.

There is still another form of home rule appeal which is heard. It consists of the protests of municipalities against state or provincial compulsion in respect of problems which may or may not affect persons or property owners outside of the municipality. For instance, New York state has recently passed a compulsory bill affecting the salaries of teachers. Personally, I think this is largely, if not entirely, a local problem, and despite my belief in increasing the salaries of teachers, I question whether the bill is a necessary limitation on the freedom of municipal action. Similarly one might protest a bill compelling a three-platoon system for firemen. A state or provincial

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policy of saving municipalities from their own folly by paternalistic compulsion is, to my mind, to be condemned in most instances. Indeed I doubt the wisdom of recent compulsory town planning legislation in Europe. Experts are prone to find a short cut to local municipal efficiency by way of state or provincial compulsion, but their progress in this direction has not been notable in America, and were some progress made thereby it would most likely be but temporary.

Compulsion by the sovereign power from which municipal corporations derive their power is quite another thing, however, when applied to intermunicipal or regional problems. The tendency to recognize that problems have a state-wide interest is growing, and to my mind the term "home rule" is likely to take on the general meaning of municipal opposition to desirable state control. This idea of home rule is certain to conflict with regional planning powers. I would not be surprised, therefore, should we soon begin to talk about regional home rule. At least the discussion would have propriety and merit following this Conference on Regional Planning. Indeed it is already implied in New York City's threat to shake off the shackles of the up-state. At all events, while there will be continual discussion and controversy over whether or not the problems of one municipality affect neighboring municipalities seriously enough to warrant compulsory outside action, yet theoretically at least there is no sound conflict between home rule and regional control. There will be disputes as to the application of regional control, but there should be none concerning the general principle. Indeed the principle is not even new for drainage laws; county government generally and metropolitan public utility commissions herald its validity. Just as problems such as the trust question, once regarded as purely state issues, have become national problems subject to federal control, so too local problems are more and more becoming regional problems, and town planning in the conven-

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tional sense may yet become regional planning, supported by state or provincial and interstate or even international legislation.

How shall regional planning be carried out? Should the legislation which Mr. Adams theoretically justified be passed and applied? In either case what other steps should be taken to put regional planning in motion?

The progress of the planning of cities depends largely upon five factors:

1. The growth of professional appreciation of the nature and value of planning by engineers and architects.

2. An understanding on the part of property owners, large and small, of the economic value of the proper development and use of lands.

3. The application of progressive planning by municipal and state administrators and officials who have become affected by town planning propaganda.

4. The development of public opinion in such ways as to encourage professional foresight and to demand adequate legislative provision of community planning powers.

5. The passing of legislation providing adequate powers to carry reasonable plans into effect economically.

Regional planning, which is city planning, carried to its logical conclusion, under modern economic and social conditions, will step forward largely on account of these same conditions. In order to give my suggestions as much value as possible, I propose to apply them to the problem of the frontier.

The first four of these factors have to do with propaganda and their importance must not be underestimated.

How much architects and engineers have contributed to community planning many of us fully appreciate; and they have still greater opportunities for service before them. Colleges, universities and technical schools are now expanding the degree of training in this field. But this is not enough. There are many professional men who have years of service yet to give, and those who will profit by

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professional training in town planning in future will find that they must always continue to refill their stock of enthusiasm, imagination and information. One way out has already been taken in Canada by the establishment of the Town Planning Institute, as well as the Engineering Institute of Canada. Both of these organizations have shown wisdom in establishing regional chapters. Vigorous discussion at a well attended meeting of the Niagara Peninsula Chapter of the Engineering Institute satisfied me on this point. Whether the Peninsula is ready to add a chapter of the Town Planning Institute I scarcely feel qualified to say, but of this I am certain, that a definitely recognized organization of men professionally interested in problems which affect town planning or the planning of the region on both sides of the Niagara River seems highly desirable, and the time is surely not far distant when the American City Planning Institute will begin the formation of such chapters.

The value of such an organization lies in the recognizable fact that professional men have a wholesome and honest interest in developing public opinion on questions in the field they represent. Professional understanding and propaganda is certain to create popular appreciation and ultimately popular demands. This will affect civic officials and municipal administrators directly, and sooner or later it will reach large property owners and finally the general public.

Public opinion, however, is not likely to make entirely satisfactory progress without organization. How effective chambers of commerce, city clubs and other civic and commercial organizations have been in the field of city planning might be proven elaborately by reference to Flint, Akron, Minneapolis, Detroit, New York, Chicago and many other cities. The real function of these institutions is to create a common understanding of community problems and to promote a wholesome citizen interest in the citizen's business. Experts are prone to ignore the

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value of these institutions, without which the city planning too often reaches only the pictorial stage and never gets in motion.

Already Niagara County has begun to plan for the region by forming a County Conference of the Chambers of Commerce in Lockport, Tonawanda and Niagara Falls, together with the Farm Bureau. But for the purpose of regional planning this organization needs specialization and territorial expansion. I therefore venture the suggestion that this conference should be followed by the establishment of a Regional Planning Association of the Niagara Frontier, with officers, by-laws and methods to be determined by those interested. Its first purpose obviously should be to urge or arrange for the conduct of a regional survey and the preparation of a regional plan. For this no compulsory powers and no legislation are needed. All that is required is the impulse, the understanding and the will to do. Whether the survey should be financed by public funds or by subscription is a question of detail, the answer to which would probably be different in different jurisdictions. Conviction and enterprise would surely find a way to take this first important step in regional planning.

Not before the time came to put the plan into effect would the real limitations of coöperation be revealed. To be sure, something could be accomplished here by persuasion. Such an association would doubtless be of great value to the departments of highways in New York state and in Ontario. I can conceive of these departments consulting such an association and its plan before finally determining on the location of main improved highways. Counties, townships and cities would be under some pressure to observe due regard for the interests of neighbors provided a regional plan had made the neighbors aware of their interdependence. Even in cities most city planning commissions have only advisory powers little more effective than a well-organized public opinion might be. Most profitable of all, perhaps, would be the gradual crystalliza-

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tion of opinion concerning legislation designed to overcome the limitations of public opinion, and the final provision of such legislation as might seem essential in the interests of the region as opposed to the narrowed interests of the individual municipalities.

That legislation will be essential to accelerate the progress of planning seems certain. There is certain to be conflict of jurisdiction. Townships, towns, cities, villages, counties, the provincial departments of agriculture and public works, the Bureau of Municipal Affairs, the Ontario Railway and Municipal Board, the Queen Victoria Park Commission, private interests including railways, the Canadian National Railway system, the Department of Railways and Canals, the Hydro-Electric Railway system, and last but not least, the Hydro-Electric Power Commission, each have a point of view and interests to protect. Consider, if you will, the significance of the activities of these. Counties build highways that lead nowhere in particular, townships build at random and cities seem to have notable ability to keep their chief approaches in a state of unhospitable disrepair. In Ontario, of course, the body of exceptional power is the Hydro-Electric, which, strange as it may seem, against the advice of its own consulting engineer, who reported that a tunnel could be built for \$1,000,000 less, scars the landscape for miles with an open cut channel that leaves Niagara Falls, Ontario, an island with consequent problems of water supply and sewage disposal, and to add insult to injury, despite the costs of transmission of power and the loss of electrical energy in transmission, sells power in Toronto and in other municipalities at rates lower than in the city of its source. I submit that the hydro-electrical development, in addition to the problems of industrial growth which it will stimulate, raises problems of regional planning that are not likely to be solved at all until they are solved both economically and fairly.

The American side of the river has somewhat similar

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problems. Here the State Conservation Commission, the Highways Commission, the Erie Canal Administration, the Public Service Commission, the State Reservation Commission, the counties, towns, cities and private interests are all concerned.

Neither side of the frontier is ready for a regional planning board with compulsory powers as yet. There is much yet to be done in the development of public opinion before such a step is feasible. Meanwhile, however, legislation is needed to give municipalities of second and third class the power to control to some larger degree the development of their surroundings and to facilitate the solution of these regional problems. That the two Tonawandas should be united seems self-evident to all who are disinterested and to most of those who are interested. If the solution of the sewage disposal problem of the frontier depends to any degree on consolidation, municipalities other than the Tonawandas may yet declare an interest in their compulsory amalgamation. The consolidation of Thorold, Merriton and St. Catherines may not be so obviously pressing, but is certainly worth serious consideration. Buffalo should have annexed Lackawanna long ago, and the time will soon be overdue for the annexation of La Salle and other territory adjoining Niagara Falls.

Engineers lean toward metropolitan or regional public utility commissions as a solution of some of the regional planning problems. Doubtless a regional sewage disposal and water system on the American side of the Niagara River would be worth considering, and Port Colborne, Welland, Thorold, Merriton and St. Catherines, and possibly Niagara Falls, Ontario, will probably discuss a joint enterprise of similar kind. But the regional problem is social as well as physical. We have problems of housing, zoning and health which are not likely to be solved by commissions designed to solve water problems. A judicious degree of timely and anticipatory annexation

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is certainly to be desired, sufficient at least to cover lands which are likely to be used for industrial and residential purposes, and which should therefore be subject to the use, heights and area restrictions which we call zoning.

Industrial cities seem, however, to have an insatiable appetite for population. If annexation is not to be unduly expensive it must not proceed too far. Additional legislation should, therefore, be added to annexation in order to anticipate the subdivision of lands which should not yet be annexed.

Possibly this paper should have begun where it ends. I have tried to lay a foundation for the preliminary steps in regional planning. The necessary legislation should receive the most careful consideration, concerning which I wish to hazard nothing more than a few points.

1. In New York state and in Ontario there should be established an adequate Department of Municipal Affairs. Ontario should be relieved of the confusion that exists concerning the jurisdictions of the new Bureau of Municipal Affairs and the Ontario Railway and Municipal Board. New York state surely should not be too belated in providing a properly manned and powerful department such as exists in every province in Canada except Quebec and Ontario.

2. Cities of the first, second and third class should be given powers to control the conditions of development of neighboring and smaller municipalities within a reasonable radius. In Ontario the proposed Department of Municipal Affairs should be given adequate compulsory powers on intermunicipal questions such as planning, as well as advisory powers on purely local affairs. New York state cities need not only the department but also the power to control the development of their environs.

3. Changes in county government should be considered. Foresight in planning indicates that the consolidation of city and county government should be in effect long before their territorial jurisdictions have become

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practically identical. For instance, should not the government of Niagara Falls and the towns of Niagara, Lewiston and Porter be consolidated, while the rest of what is now Niagara County continues its present status? Similar steps might be taken in Erie County.

4. A preliminary step might be taken along the lines of a bill introduced in the Wisconsin legislature during the past winter, providing for a rural planning division of the Department of Agriculture to promote the health, general welfare and amenity of the settler and the development of community centers and other social objects. The bill which contemplates the formation of county rural planning committees in each county gives an indication of the growth of public opinion in the right direction. Rural planning is in some respects only parallel to city planning. To be complete, both should be made integral parts of regional planning.

The Wisconsin idea combined with the consolidation of city government and county government would in some instances help greatly in solving the regional problem. The combination would also have the merit of recognizing regional problems and at the same time avoiding direct conflict with the faith and doctrine of home rule.

ENGINEERING PROBLEMS OF REGIONAL PLANNING

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Town planning, as a conscious art, had its birth in the desire to add beauty and attractiveness to towns for which, it was at first assumed, the problems of convenience, sanitation and amenity had already been reasonably well solved. Many town planners, therefore, enthused in their quest for "The City Beautiful," lost sight at times of the engineering problems of town planning. But all this is changed now, for experience has proved the mutual interdependence, in community building, of beauty, convenience, sanitation, amenity and economy. And it has long been recognized that the old solutions of the engineering problems of urban life can never be complete or adequate in a place which, like Topsy, "just grewed." Town planning, therefore, no longer seeks "The City Beautiful" alone; its ideals have broadened and deepened until they comprehend all that is implied in that truest beauty which Lethaby defined as "the well doing of what needs doing," — which consists in the harmonious adaptation of a thing to the needs of human life. And so, from a question of art, town planning has become more and more one of engineering and a program for future construction.

Regional planning is still newer as a conscious art. Born in the efforts of neighboring towns to coöperate in the solution of their joint engineering and utility problems, it has developed until today its ideals, as applied to regions, are as broad as are those of town planning. Here in America this development is due more, perhaps,

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to Mr. Thomas Adams than to any other one man. He pointed the way when he told us, three years ago at Cleveland, "The first thing you have to do is not to plan Cleveland, but to plan Ohio and fit the plan of Cleveland in with the plan of Ohio." And it is significant that Mr. Adams should be the principal speaker today at a session of this conference, given up wholly to the discussion of "Regional Planning."

The origin of this new art guarantees from the start that its dependence upon engineering will be recognized. Beauty is as vitally necessary in regions as in towns,—but as the region is a little more remote from the individual than is the town, it is easier to see that the prerequisites of beauty are sanitation, convenience, amenity and economy, and that many of the most important problems of regional planning are engineering problems.

This paper will discuss briefly some of these problems. Limitations of space permit little more than reference to some of them; but the attempt will be made in each case to point out the relation of the particular problem to regional planning, and the advantages of regional, as compared with local, solutions. Among the problems referred to will be the study of the geographical and industrial characteristics of the region; the development and interconnection of steam, electric and water transportation; the arrangement and construction of main highways; joint water and sewerage systems; regulation of streams; supply and distribution of light and power; the organization of regional utilities; and the apportionment of the cost of regional works.

SURVEY

The first requisite of a regional plan is a comprehensive survey of the topography, geography, population, natural resources, agriculture, industry and trade of the region, much of which is an engineering study. And one result of such study should be a complete topographic map of

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the area which may serve as a base map for the regional plan. Not only should this map show the topography and locations of towns, railroads, streams, canals and other natural and structural features, but the data on natural resources, agriculture and industry should be correlated with it in such a manner that maps may be prepared showing the relative distribution of all the factors affecting the life of the region.

The topographic maps of the United States Geological Survey are excellently adapted to use for these purposes, but unfortunately only a portion of the United States is now so mapped. To the present, interest in completing this valuable map of our country has largely been confined to certain branches of the engineering profession. But the cause should have the strongest appeal to all who are interested in regional planning, and it is hoped that this conference will go on record as supporting the concerted effort that is now being made by the engineering societies to secure favorable action, during the present session of Congress, upon the project of the immediate completion of the topographic map of the country.

RAILROAD TRANSPORTATION

Railroads are the arteries through which the lifeblood of our country's trade flows. Fortunately, the considerations relating to natural resources, most favorable locations of industries and movements of population which should mold the regional plan have guided the self-interest of those who have been responsible for the development of our railroads up to the present day. But while this is generally true, it does not apply universally, and selfish interest has sometimes diverted development to lines less well adapted to the public interest. Moreover, our past theory of regulation by the maintenance of competition and the prohibition of pools and traffic agreements has itself compelled development in some instances in ways

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which would not have been dictated by wise forethought and regional planning.

The experience in joint operation of the railroads during the war has brought some of these truths into striking relief, and gives assurance that we will never go back to conditions of before the war. The new order that is to be established in the near future, when the railroads have been returned to their owners, must provide for avoiding so far as possible the mistakes of the past, and regional planning is an especially timely topic, as offering a method by which future railroad developments may be made to conform to a wisely planned conception of the public interest.

Regional planning must take into account that railroads are best adapted for long haul, through traffic. It must, of course, be based upon the existing railroad systems, and must provide yards and terminal facilities, both for facilitating through movement and for convenient transfer to local short haul roads and to electric and water transportation routes. The study of electrification must be continued in connection with the elimination of noise and dirt in our cities, and with the general power program for the region in which the railroad is located. And a new type of organization and regulation must be found which will at the same time protect the public interest and encourage the development of the railroads so as to serve the needs of industry.

ELECTRIC TRANSPORTATION

The electric railways are the natural complements of the railroads. Admirably adapted for short haul and interurban traffic, they should be developed along with, and not in competition with, the trunk railroads. The growth of urban life requires more and more that city workers shall live in outlying districts and depend upon cheap and rapid transportation to go to and from their work. And a great field for short haul freight carriage

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of agricultural products from the farm to the neighboring city or steam railroad terminal remains only partially developed by interurban roads. The regional plan should recognize the distinct function of the electric line in the transportation service of the region, and should provide the program for its performance of that function best fitted to the solutions adopted for the other problems of the region.

WATER TRANSPORTATION

One of the striking things brought out at the time when the war threw its peak load upon our railroads was the help which might have been obtained from our rivers and canals, and the extent to which we were unprepared to utilize them. This lesson should not be forgotten after the war, and improvements of waterways may be anticipated on a far more extensive scale than ever before. It is to be hoped that such improvements will not continue to be made upon the basis of the "pork-barrel" methods of the past, but that rational regional planning will establish the true function of water transportation, in combination with steam and electric lines, and will provide a reasonable program for the development of our transportation system as a whole.

Such planning, also, will recognize more clearly than ever before the necessity of interconnecting these various types of transportation routes,—of building joint terminals, with adequate wharves, docks, warehouses, railroad yards, cranes and electric facilities, so that the transfer and transshipment of passengers and freight may be accomplished most economically and most efficiently, and so as to secure the greatest usefulness from the combined system.

MAIN HIGHWAYS

If the railroads are the arteries of trade, then the highways are the veins through which the individuals engaged

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in it receive the blood which quickens their lives. The amount of wealth which is produced and which cannot be placed upon the railroad without the intervention of a haul by wagon or truck is vast. Agricultural communities are wholly dependent upon highway transportation for their life. And the growing use of automobiles and trucks and the development of interurban vehicular traffic give highways more importance than ever before. This is clearly recognized throughout our country, as is witnessed by the development of the good roads movement, which is responsible for the construction of hundreds of millions of dollars' worth of highways now under construction or planned.

But regional planning cannot permit that the highways of the future be located and constructed as have been many of those of the past. Main roads will no longer be located with reference to section or property lines, but with reference to topography, the distribution of products creating traffic streams, and the coördination of the highway system with the railroads, electric lines and waterways. The types of construction will be carefully adapted to traffic needs,—not only as to road widths, but also as to gradients, surfacing and drainage.

WATER AND SEWERAGE SYSTEMS

The advantages of regional water and sewerage systems are often particularly striking, and serve excellently to illustrate the value of the regional plan. Water supply problems depend for their solution more upon source of supply than upon any other consideration. The sources in any region, suitable for water supply purposes, are limited in number and capacity, and a city may do lasting injury to a region by developing its supply without regard for the needs of its neighbors. This was recognized by a state department of health recently in our own practice, where approval on a joint project for two im-

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portant cities was withheld until the state should have had time to investigate thoroughly the water resources and the needs not only of these cities but of all the population within the region.

Sewerage is strictly a drainage area problem, and unnecessary expense as well as mutual damages of many kinds result from attempts to solve it with respect to political boundaries alone. Moreover, the bodies of water into which sewage may be discharged, like the sources of water supply, are limited in number and oxidation capacity, so that the problem of sewage disposal is also a regional, and not a local, problem.

Furthermore, as commuting, electric transportation, automobiling and other forms of regional circulation have developed, it has become increasingly evident that the health of a community depends upon water and sewerage conditions throughout the area in which it is situated, and not upon its own systems alone. The city with the purest water supply may suffer from epidemics if the suburb in which large groups of its workers reside supplies contaminated water to its consumers; while elaborate sewage disposal is of little avail to a community if towns upstream dump untreated sewage into the river on which it is located.

Not only does the public health require the planning of water systems and sewerage systems on regional lines, but it requires also that they be planned in proper relation to each other. The availability of sources of water supply within a region is determined largely by the locations of its sewerage outlets. And the extent and character of sewage treatment needed to avoid nuisance, depends considerably upon the prospective use of its water resources for water supply purposes.

Finally, as population continues to grow, it will be more and more apparent that economy is subserved by regional solutions of these problems. Duplications of plants and paralleling of water lines and sewers will be avoided. And

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besides, large scale production pays,—in these forms of public service as well as in industry. Interest and depreciation upon capital investment are less per million gallons or per capita for a large plant than for a small one; while general expenses may be little larger in a system serving a metropolitan area than in one serving a single municipality within it. Even operating or “output” expenses per unit may be decreased by the higher efficiencies and the additional economies which are possible in large plants.

All of these advantages have been frequently recognized in the handling of water and sewerage problems. State departments of health have established supervision of water supplies and sewerage systems so as to prevent communities from injuring one another, and to maintain standards within state lines. And many examples exist of joint action by neighboring municipalities for the solution of their common problems,—as at London, where the Metropolitan Water System supplies 2 cities, 27 metropolitan boroughs, 1 county borough, 7 non-county boroughs, 46 urban districts, 12 rural districts, 53 poor-law unions and 300 parishes, including an area of 537 square miles in 6 counties; at New York, where sewerage and drainage plans have been made for an area of 700 square miles in New York and New Jersey, with a population of 6,000,000; at Winnipeg, where the Greater Winnipeg Water District supplies an area of 91.7 square miles and a population of 238,000 in 7 district political subdivisions; and at Boston, where the Metropolitan Water and Sewerage Board is charged with the sewerage and drainage of 12 cities and 11 towns, covering an area of 191 square miles and with a population in excess of 1,000,000, and supplies water to 9 cities and 9 towns, with a total area of 174.8 square miles and a population of 1,200,000.

Most previous efforts, however, have been gradual outgrowths compelled by the necessity of correcting the re-

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sults of uncontrolled development. Regional planning proposes the substitution of foresight for hindsight, the study of water and sewerage problems for whole regions, with consideration of all the other related regional problems, and the adoption in advance of regional plans for water supply and sewage disposal in accordance with which development may be carried out.

STREAM REGULATION

Another problem for which satisfactory local solutions are obviously impossible and drainage area solutions absolutely indispensable, is that of stream regulation and water conservation. Navigation requires a uniform sufficient depth of water throughout the navigable length of the stream. Local flood protection works may actually increase flood heights above or below them. The interdependence of the water and sewerage problems of communities within a region has already been pointed out; while the best utilization of water power requires that its development and distribution be based on regional, and not on local, considerations.

Moreover, it is of great importance that stream regulation be based upon the consideration of all the uses of water, and not of one of them alone. A diversion for water power purposes may destroy an important future source of water supply. Certain types of flood protection works may prevent the utilization of a stream for navigation. Reservoirs may often be utilized for a combination of purposes. And the regional plan will consider stream regulation from the point of view of securing from the water resources of the region, at the lowest cost, the combination of uses which will contribute most to the welfare of the population, and to the solution of their other regional problems.

As in the case of water and sewage, the advantages of stream regulation by drainage areas have been so long

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recognized that numerous examples can be found of the organization of districts for the development of regional stream regulation plans.

Typical of these are the coöperative organizations for the drainage of swamp lands, the construction of levees and the prevention of floods, which are found in Canada and the United States and in other countries. The levee districts of the Mississippi Valley have united counties and states in the effort to protect property against the inundations of that great stream. Irrigation and drainage districts created by the Canadian Dominion and United States National Governments, and water users' associations in the arid West, unite groups of owners of adjoining property to secure sufficient and equitable control of their joint water supplies.

A number of conservancy or flood prevention districts have been organized in the state of Ohio, the most important of which is the Miami Conservancy District, covering about 4,200 square miles, with a total population of about 1,000,000 people. This district was organized after the disastrous floods of 1913 to protect the city of Dayton and other cities in the valley of the Miami River from similar catastrophies in the future. Plans were prepared for the construction of a number of detention basins for flood prevention purposes, which have now been constructed and are shortly to be publicly dedicated to the service of the district.

Numerous similar projects will probably be undertaken in Ohio; and New York, Indiana and Wisconsin have somewhat similar legislation. Pennsylvania has long been confronted with the flood and stream regulation problem, but as she has had abundant resources of coal, oil and gas, the value of the use and control of water has not been appreciated heretofore. Within the last few years, however, a lively interest in these matters has developed in Pennsylvania, and it is hoped that legislation may be adopted before many years which will permit organiza-

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tion of districts, control of floods, increase of low water flow, and the development of power.

The thorough study of the flood situation in Pittsburg which was made some ten years ago by the Pittsburg Flood Commission, established clearly at that time that the problem was not a local one at all, but one in which great stretches of the rivers were involved and which would necessitate the construction of public works far beyond the city limits. Whenever suitable legislation is secured, one of the projects which will be undertaken will no doubt be the organization of a district to construct the seventeen storage reservoirs recommended by the Commission, and estimated to cost about \$20,000,000.

LIGHT AND POWER

The type and locations of regional sources of light and power will depend largely upon the characteristics of the region with respect to availability and location of coal, natural gas and hydro-electric power. But the economic advantages of power generation in large central stations need no demonstration in these days of efficient, large-capacity generators and of high tension transmission. Enlightened self-interest has long recognized this, and the results may be seen in the unification of the gas supply systems in the neighborhood of every field of natural gas, and in the huge electric central stations and the network of electric supply and distribution lines which characterize every one of our large urban districts.

Regional planning proposes only to substitute for enlightened self-interest the broader consideration of all of the problems of the region, and to realize these economies in the manner which will fit in best with the requirements of industry, transportation, water utilization, conservation of natural resources and general welfare.

One of the great advantages of considering this problem from a regional point of view will unquestionably be

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the growth of the supply of light and power to rural districts and farms. Such a contribution to the comfort of farm life may go far toward counteracting the drift of rural population to the city, which has threatened so much, in late years, the maintenance of agricultural production and the abundance of foods with which we have hitherto been blessed.

The region here about Niagara Falls, on both sides of the international boundary, affords a striking example of the possibilities of coöperation for the supply of power. And no better illustration of the value of regional planning for this purpose can be found than the system of the Hydro-Electric Commission of Ontario. This Commission, organized in 1906, now supplies power to more than fifty municipalities, and its service and rates are an excellent example of what can be done by combined action. No proof is required to show that it would be impossible for the several municipalities to secure anything like the same service through independent action, except at greatly increased cost.

An even more suggestive proposal relative to regional planning for power supply is found in the projected study of a comprehensive power system for the entire North Atlantic Coast, from Washington to Boston, for which Secretary Lane has asked an appropriation of Congress. The plan to be studied comprehends the interconnection of the power systems of the entire area; the joint utilization of existing central stations; the pouring into a "river of power" of current from the Falls of the Potomac, Niagara and the New England rivers; and the construction of giant generating stations at the mines in the coal fields of West Virginia and eastern Pennsylvania.

It is possible that the study may show a considerable reduction in the cost of power throughout this region, as is claimed by its authors. But whether it does or not, it will serve as a striking illustration of the broad lines upon which the regional solution of such a problem may proceed.

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ORGANIZATION

Organization for carrying out the works of a regional plan is not solely an engineering problem. Existing political organizations must, of course, be the bases of it, and intricate legal and organization problems must be solved to build up the group of related organizations (for each problem may require separate organization) required to secure the results desired. But the selection of desirable types of organization is so closely tied up with the planning and use of the public works involved in a regional plan, that no consideration of its engineering problems would be complete without reference to it.

The type of organization depends in each case, not only upon the existing political organization and upon the area and density of population of the region, but also upon the particular purpose or combination of purposes to be accomplished. Dependent upon these factors, examples of community coöperation can be found, varying through a wide range with respect to functions involved, degree of centralization of control, and methods of financing and apportioning cost. Most of the important cases, however, can be classified under one or the other of six headings, as follows:

1. Extension of municipal limits and consolidation or annexation.
2. Extension of municipal jurisdiction.
3. Contracts between municipalities.
4. County administration.
5. Private enterprise.
6. District organization.

1. *Annexation*. — The oldest of these methods, and the one that has been resorted to in the growth of the region around practically every city, is annexation — actual incorporation of adjacent territory into the city, and complete centralization of authority with respect to public

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works, public safety, legislation, taxation and all other municipal functions. This may be brought about by mutual agreement between the city and the annexed suburbs; or (under some forms of legislation) by a majority of all the voters in the territory affected, regardless of the wishes of the voters of the suburbs to be annexed.

Now what are some of the advantages and disadvantages of annexation? One likes to be considered as Paul said, "a citizen of no mean city." There is, no doubt, some advantage in advertising value, to business houses, banks, commercial institutions—even perhaps to the common citizen, in being able to refer to the city as larger than some competing neighbor. The large city, also, is better able to attract new operations, and to finance larger and more expensive public improvements. There is thus, perhaps, some real justification for the pride that is frequently taken in the figures published in the census reports.

Furthermore, it is true in some instances that the territory lying adjacent to a city is completely continuous with it in development, so homogeneous with it in population and interests that consolidation may be the best possible solution of the problem.

Size, however, does not always spell economy and efficiency. With the growth of the city, the old "town meeting" for expressing the desires of the citizens becomes impossible. It is difficult for the voters to keep in touch with the actions of their elected representatives. The problems of municipal government become increasingly complex and difficult, leading too often to dishonesty and misgovernment.

Moreover, the large city develops entirely new problems of congestion, housing and transportation, which add to the difficulties of the situation.

A further disadvantage of annexation is the loss of local civic spirit, which is difficult to keep alive in the large modern city. For all of these reasons, annexation is not

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always looked upon with favor—particularly where the boundaries between adjoining communities are still distinct, where populations are not homogeneous, and where local interests, at some points, conflict. Under such circumstances there are additional disadvantages in consolidation. For, if a majority vote of the citizens of the territory to be annexed is to be secured, it is often necessary to make undesirable concessions to them. And, if the territory is taken in against the wishes of a majority of its citizens, a spirit is engendered that may take many years to eliminate.

There are, therefore, undoubtedly circumstances when annexation will fail to provide successfully for the needs of neighboring municipalities.

2. *Extension of Municipal Jurisdiction.*—The recognition of this community of interest between city and suburbs, and of the futility of permitting the efforts of the city to be negated by conditions just outside its limits, has in some instances led to legislative extension of the city's jurisdiction, in certain respects, over areas lying outside its boundaries. This has been done most commonly in connection with town planning and approval of lot plans, but has been suggested for other municipal functions. It is applicable, however, only in cases where a very large city is surrounded by small suburbs. Even in such cases, however, the control of the large unit is apt to be resented and opposed by suburban communities, and it would never be tolerated by a neighboring municipality approaching the larger city in population and importance.

3. *Contracts between Municipalities.*—A third method of extending a single public service beyond the limits of a single municipality is by voluntary agreement evidenced by contracts. Thus a city may agree to supply water, dispose of sewage, or furnish other municipal services to an adjoining community for an agreed fee. Such an arrangement is limited in scope to comparatively simple cases,

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where the relations between the two contracting parties are clearly defined. This method would hardly be successful where a number of communities, of nearly equal importance, are involved; not only because the contractual relations become so complicated as to make their definition in advance difficult, but also because, in such case, the municipalities are seldom willing to leave the operating control of the service in question entirely in the hands of one of their number.

4. *County Administration.*—The county form of government has often been suggested as a means of carrying out some portions of a regional plan. The London County Council, which has charge of many of the municipal functions of the London Metropolitan District, is frequently cited as an example of its success. The illustrations of Philadelphia and Cook Counties for Philadelphia and Chicago are also sometimes referred to. It must be remembered, however, that the saturation of population is quite complete throughout the areas referred to, and that these counties are practically coterminous in fact, as well as in political organization, with the cities in question. Ordinarily, conditions are entirely different and the wide variations in the degree of development of portions of the county, ranging from congested city property to farm lands, precludes the successful application of the county form of organization.

Furthermore, it is true, at least in the United States, that county governments are particularly concerned with the administration of judicial functions; and they are neither efficient enough in organization nor sufficiently representative in personnel to administer the complicated municipal services of which we are speaking.

5. *Private Enterprise.*—A very good demonstration of the advantages of centralization of control for certain types of public service may be found in the extensive public utility systems which have grown up under private ownership in many communities; and the economies that

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appeal to intelligent self-interest are equally valid as arguments for community coöperation.

These developments of private enterprise suggest a fifth method of securing the results of collective action; and indeed where municipal coöperation is impossible, or where conditions are such that the development is not likely to secure the services of men of the highest grade of ability under public control, it may be the best method, provided the public interest is protected by carefully drawn franchises, and by a comprehensive system of public utility regulation.

Where coöperation under public control is possible, however, private ownership would hardly be suggested in this day for any regional project important enough to ensure that men of the very highest technical ability and administrative capacity would be attracted to its service.

6. *Organization of Districts.*—A great many of the defects of the methods of organization previously described may be avoided by the organization of regions, or portions of them, for particular purposes, into districts. Such districts, organized usually by special legislation under the direction of representative commissions, leave the political functions of the included municipalities untouched, and thus preserve "home rule" and encourage local initiative and civic spirit; by confining their activities to specified public services they tend to avoid the danger of political interference; by representative government they protect the smaller municipalities and rural areas from the domination of the larger cities; by including selected territory the inequalities of county administration are eliminated; and by providing for continuous, capable administration they can be adjusted to situations beyond the scope of any contract that might be drawn *a priori*. Thus all of the economy and efficiency of private enterprise is possible of attainment, with none of the objections to private ownership. In other words, the district achieves most of the advantages of the other types of organization

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described, while avoiding most of their undesirable features. And, except in the special instances to which reference has been made where one of the other forms of organization is especially applicable because of unusual conditions, the district is the best solution of the problem.

It must not be supposed that there are not pitfalls to be avoided in organizing a district. The difficulty of securing complete representation sometimes leads to opposition on grounds of "taxation without representation." The development of works ahead of immediate needs is apt to be criticized, but with wise planning only the plan and a few permanent works need be based upon future conditions, the greater part of the construction being carried out from time to time as it is required. The distribution and apportionment of the cost, and the determination of what part, if any, shall be borne by the territory not yet developed, but which will be brought into development by the building of such works, are all difficult, and have proved to be the rocks upon which many a good scheme has been wrecked. None of these dangers, however, are inherent in the method; and all of them may be avoided, if local pride and self-interest can be eliminated, and if a broad, public-spirited view of the situation will be taken by all.

Within a given region, each of these types of organization may be represented, different ones being adopted for particular areas and for particular problems. But the conception of regional planning contemplates that all of them shall be directed and guided by the regional plan,—that the plan shall be a kind of regional constitution with which the subsidiary organizations must not conflict.

APPORTIONMENT OF COST

Like the problem of organization, apportionment of cost is in large degree a financial, legal and political problem. But like the selection of organization types also, it is so closely bound up with the use of public works that it is

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largely an engineering problem, too. In most cases, the method used may be classified under one of four headings, or as a combination of more than one of them, as follows:

1. General taxation.
2. Regional general taxation.
3. Special assessment.
4. Rates based upon quantity of service used.

1 and 2. *General Taxation*.—General taxation requires no definition. It would provide simply that the portion of the cost of works so paid would be disbursed out of the funds of the region, state or nation and assessed upon taxable property, real and personal, or upon incomes even, by the proper authority, in the same manner as that in which all other taxes are assessed. It would be applicable only to the portion of the cost of works chargeable to the general interest, and would normally be confined to the region benefited by the works. In some states, however, as for example in Pennsylvania, the creation of special taxing districts is prohibited by the Constitution, so that general taxation can be utilized only to the extent that contributions to the cost of works can be secured from the municipal, county, state and national governments.

3. *Special Assessment*.—The method of special assessment, although originally an English idea, has had its greatest development in the United States. On the continent of Europe, only Belgium and Germany have used this principle to any considerable extent.

Its history in Great Britain, however, covers more than two centuries. The first law was passed in 1662, authorizing the widening of certain streets in Westminster; and, after the London fire of 1666, a similar act was passed to provide for the rebuilding of the city. In New York in 1676, the cost of digging wells on Broadway and Pearl Street was assessed, one-half to the city and one-half to the property holders nearest the wells. The comprehensive

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special assessment law enacted for New York in 1861 is said to be the first in the United States.

Such laws, of course, are subject to the constitutional provisions of the state or province in question. General application, therefore, may not be possible.

The theory underlying special assessments is that the property on which they are imposed receives particular benefits and that general taxation for such purely individual purposes is unjust. Any community, individual or land that receives a particular advantage should pay for it in proportion to the benefit derived. It is evident that no fixed rule can be established to cover distributions of the expense of large public works, such as those required by regional plans. Also, there should be no assessment in case no benefits are derived, and, as has been held by some court decisions, "Burdens in excess of benefits . . . must be borne by general taxation." Cooley in his book on "Taxation" states the rule as follows:

"The only safe and practicable course, and the one which will do equal justice to all parties, is to consider what will be the influence of the proposed improvements on the market value of the property; what the property is now fairly worth in the market and what will be its value when the improvement is made. . . . There can be no justification for any proceeding which charges the land with an assessment greater than the benefits. It is a plain case of appropriating private property to public use without compensation."

4. *Rates*. — This method of apportioning cost is applicable especially to public utility services, like steam and electric transportation, light and power systems, and joint water supply and sewerage systems. Their determination, so as fairly to apportion the necessary gross revenue, is an intricate economic and engineering problem, and public supervision by utility commissions is required to make sure that they are maintained at a reasonable level.

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Some instructive examples of combinations of methods of apportioning cost are found at Boston, Passaic, Winnipeg and Vancouver, and are described below:

Boston Methods of Apportionment.—The most notable examples of metropolitan financing in the United States are those of the Boston Metropolitan District for sewerage and water works. As originally proposed, the assessments for the construction of the trunk sewers and disposal and outfall works were to be determined by three commissioners, appointed by the Supreme Judicial Court, allotments to be made each five years in advance. No basis was stipulated in the original act. In 1906 it was enacted that the assessment upon the various cities and towns should be based upon the respective taxable valuations of property, to meet the interest and sinking fund requirements for the sewer loan, and upon the respective populations of the several cities and towns, for the purpose of meeting the maintenance and operation expenses. In case less than the whole area of any city or town used the system, such apportionment should be based upon the population of the areas so using the system.

For the purpose of assessing the cost of the water works, Boston, the largest unit in the district, formerly paid each year the same proportion of the total annual cost that its assessed valuation during the preceding year bore to the total valuation of all the cities and towns in the district, but any city or town which had not reached the capacity of its own system and was not using water from the metropolitan supply was assessed on the basis of only one-sixth of its valuation. After deducting Boston's payment, the remainder of the annual cost was to be apportioned to the other cities and towns, one-third in proportion to their respective valuations, and two-thirds in proportion to their respective populations. It is evident that such a method of apportionment of expense would not tend to restrain waste of water, and in fact it was found at one time that one of the cities of the district was pay-

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ing off a debt by permitting the creditor to use an excessive amount of water without charge.

Such abuse and the generally extravagant use of water, which indicated an early need of providing new sources of supply, led in 1904 to a new method of assessment. The proportion for Boston was enlarged, and those cities and towns which had not reached the capacity of their own works and were not using the metropolitan water, were assessed on the basis of one-fifth of their total valuation. The remainder was apportioned, one-third in proportion to valuation, and two-thirds in proportion to use of water during the preceding year. In the year 1907, because of the apprehension of the farmers in those portions of the state from which new supplies might be drawn, an act was passed, compelling those cities and towns which derived any portion of their water supply from the metropolitan district to install meters at the rate of 5 per cent per year until all services should be metered.

Under each of these methods of assessment a large burden was placed upon the city of Boston, which had the greater density both of population and valuation. One reason for this, which may be worth remembering in the formation of similar districts, is that the Metropolitan Water Board, upon beginning its work, took over all of the lands, reservoirs, pumping stations and other water supply works and property of the city of Boston, and paid for these a large sum of money, amounting to \$1,118,000.

Passaic Method.—The method of assessment for the building of the trunk sewers and outfall works for the Passaic Valley was not fixed in the act which was passed March 18, 1907, but an agreement, entered into between the Passaic Valley Sewerage Commission and the three cities and twelve towns and boroughs comprising the district, did fix, on May 15, 1911, the apportionment of the expense and the method and time of making payments thereon. The relative capacities required by the several municipalities were determined by the Board of Engineers,

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after the completion of the designs and upon the approval of the details of the entire system. The cost of construction was then apportioned between the several municipalities, somewhat in proportion to these relative capacities, allowing, however, about a 50 per cent increase for the city of Newark, the largest place in the district. It was further agreed that the annual expense of maintenance and operation, and the administrative expenses of the commission, are to be assessed upon the several municipalities in proportion to the amounts of sewage delivered by them into the main trunk, as determined by measuring devices to be maintained by the commission.

Winnipeg Assessment.—The Winnipeg war act provides that one-half of the amount required for interest on first cost sinking fund payment, and cost of maintenance and operation, shall be borne by the land included within the water district, and which may be supplied from the works; and it is important to notice that it is land, exclusive of improvements. Certain lands held by the king, or for the use of the dominion or province, or by any municipality, or for public schools, hospitals, architectural or horticultural societies, or burying grounds are excluded. A special board is created for the fixing of these assessments. The other half of the total annual cost is to be borne by the sale of water to municipalities and to individual consumers.

Vancouver Payments.—The Vancouver sewerage act provides for the assessment of 30 per cent of the cost of the entire scheme upon all of the municipalities of the district, in proportion to their respective land valuations. The remaining 70 per cent of the cost of each project is to be assessed in proportion to valuation upon the lands within the drainage area affected. The annual costs of maintenance and operation are similarly assessed in proportion to valuation upon the lands located within the drainage districts affected.

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CONCLUSION

The great engineering problem of regional planning, however, is the comprehensive planning of all of these features with consideration of their relation to one another, so as to secure the greatest good at the lowest possible cost. Steam transportation must not be developed without reference to or in unnecessary competition with electric and water transportation. Main streets must not be planned solely with a view to carrying through traffic — if, for example, a slight modification of the location of a boulevard would provide a right of way for a trunk sewer and avoid the condemnation of expensive additional property, it would be indefensible to fail to consider it. Sewage outlets must not be located without reference to water intakes. And stream regulation must not be studied for one purpose, but consideration must be given to water transportation, flood prevention, water supply, sewage dilution and power development, so as to secure that combination of results which represents the greatest good per dollar spent for the entire region.

If this broad engineering conception of regional planning can be kept before us, all of the inherent advantages can be realized, and its future will hold for mankind a store of benefits as much greater than those which have come from town planning as its field is more extended.

SEWERAGE AND WATER SUPPLY — NIAGARA FRONTIER

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In this discussion the territory considered embraces the borderlands on both sides of the Niagara River, which forms the natural boundary line between New York state and the province of Ontario. The river is about 35 miles long and connects Lake Erie with Lake Ontario. Lake navigation is carried to the ports of Tonawanda and North Tonawanda. The river drains an area of about 87,000 square miles above Buffalo, having a population of at least 600,000, and has a local drainage area of approximately 1,250 square miles. Along the margin of the river are situated the American cities of Buffalo, Tonawanda, North Tonawanda and Niagara Falls; the villages of La Salle, Lewiston and Youngstown. On the Canadian side is the city of Niagara Falls, Ontario, and the villages of Bridgeburg, Fort Erie, Chippewa and Niagara-on-the-Lake. The land in this area is generally level south of the escarpment, and has an elevation of ten to twelve feet above the river, with the exception of a portion of the city of Buffalo and vicinity.

The population on the Niagara frontier at the present time may be taken at about 700,000. The greater part of this population is on the American side, and this discussion will be devoted largely to this territory. An increase in population on the American side to 1,000,000 will result substantially in a continuous population along the margin of the river from Buffalo to Niagara Falls, and ultimately there will be a Greater City. With such

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exceptional transportation facilities, both by water and rail, and with its extraordinary water power development, we shall have one of the greatest cities on the American Continent.

WATER SUPPLY

All of the municipalities take their water supply from the river, care being taken to select the most favorable locations with reference to shore pollution, and each intake being above the sewer outlets of the community it serves. They have, however, no protection against pollution from communities situated above them on the river, and by reason of the fact that Buffalo is located at the junction of Lake Erie and the river, the lower communities are exposed to the larger share of the pollution.

All of the communities discharge their sewage untreated into the river, and this has resulted in continually increasing pollution so that remedial measures must be taken to protect the water supplies. Two methods of relief are possible:

First, preliminary treatment of the sewage previous to its discharge into the river.

Second, removal of sewage by diversion to Lake Ontario.

Treatment of Sewage

It must be admitted that our ideas regarding the purification of sewage have undergone a radical change. It is now known that complete purification of sewage cannot be attained on a large scale. The one rational method, that of filtration through sand beds, will produce quite satisfactory results, but at a cost that is prohibitive. At Worcester, Mass., about two million gallons a day are filtered through 18 acres of carefully prepared beds, with a removal of organic matter of 88 per cent. At the same city ten million gallons daily are treated chemically in sedimentation tanks with a removal of 45 per cent of organic matter. At Columbus, Ohio, sewage is applied to

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broken stone sprinkling filters after previous sedimentation in large tanks; the percentage of removal is about 67. Mr. Kuickling has estimated the capitalized cost (report to city of Rochester) of the above as follows: Worcester, Mass., sand filtration, \$17 per million gallons; chemical precipitation, \$14.85 per million gallons; Columbus, Ohio, sprinkling filters, \$9 per million gallons.

The city of Rochester has completed its project for the diversion of substantially all sewage from the Genesee River. The sewage is intercepted at the river and carried mostly in tunnel to the treatment works on the shore of Lake Ontario about two miles east of the outlet of the river. The plans for the disposal plant provide for detritus tanks having both coarse and fine screens, and sedimentation tanks of the Imhoff type. The effluent is discharged in the lake in a submerged pipe at a point about 7,000 feet from the shore. At present the production of sewage is about 22,000,000 gallons daily and provision is made for a population of 390,000.

This is the latest type of a partial purification plant on a large scale, and the same general type with provision for disinfection has been selected in making estimates for the Niagara River project, as set forth in the report of the consulting sanitary engineer on remedial measures for the protection of boundary waters. The general features of the plan consist of interceptors for collecting the sewage and delivering to pumping stations with necessary mechanical plants and treatment works. The application of this method of treatment to the Niagara River is based on the following conclusions:

1. Water supplies taken from streams into which sewage is discharged are safe for use after purification, provided the load on the filter plant of the water supply is not too great.

2. That the use of the river as a natural resource for sewage disposal by dilution is justified provided the burden on the water purification plant is not too great.

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3. In general, no more elaborate method of treatment should be required than the removal of suspended solids by fine screening or sedimentation, or both, followed by disinfection.

Taking into consideration future growth, the consulting engineer of the International Joint Commission has prepared estimates for this project based on a population of 1,000,000. The cost of construction of interceptors, mechanical plant, treatment works, together with operating charges, is fixed at 68 cents per capita per year. The total annual cost, \$685,000. This may prove somewhat low, as no duplication of pumping plant is estimated and the cost of interceptors does not appear very liberal.

Diversion Projects

The sewage may be removed entirely from the river and discharged into Lake Ontario. It could be accomplished by constructing an open canal, by a marginal trunk sewer or by open canal and tunnel combined.

1. *Open Canal*.—This project need not be discussed at great length because in the absence of extensive surveys its location cannot be sufficiently defined to determine to what degree the present drainage could be intercepted. The land on the margin of the river beyond the city of Tonawanda would not be available. The cost of this project would be prohibitive were it not possible to take advantage of the difference in the elevation of the lakes for developing water power.

2. *Marginal Trunk Sewer*.—This sewer, located along the margin of the river, would extend from South Buffalo to Lake Ontario, a distance of about 41 miles. Consideration was given to it by the joint commission and a comparison of cost made with the sewage treatment plan. Its feasibility was questioned on the ground of greater cost. In making the estimate separate treatment plants and interceptors were included in very liberal amounts.

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The sewer should be in tunnel and placed at sufficient depth to provide gravity drainage for the entire district, and a single treatment plant located near the shore of the lake operating by gravity power should be developed to operate and light the plant in the same manner at Rochester.

A financial advantage in favor of the sewage treatment plan is based on the assumption that the waters of the river, which are most important in connection with municipal water supply, are not fit for domestic consumption without purification, and could not by any feasible method be protected to that extent. In a general way it may be asserted that water supplies taken from streams and lakes which receive drainage from agricultural lands, rural communities, and towns, are unsafe for use without purification. The decision must rest on the question of whether the diversion of all sewage from the margin of the river will leave the river sufficiently free from pollution to protect the water supplies. The drainage area of the Great Lakes is estimated at 202,730 square miles, of which 107,642 square miles is land surface. The United States Geological Survey estimates the population on this area, in 1909, at 8,200,000. The pollution resulting from this population is confined largely to the connecting river and a limited area in the lakes at the outlets of the rivers, and near the great cities.

Extensive investigations have been made at Cleveland and Toronto, and other points. These demonstrate conclusively that the great body of water in the lakes is pure and sterile. Such vast bodies of water are provided by nature with the means of self-purification. The investigations of the International Joint Commission show that at the eastern end of Lake Erie the waters were pure with the exception of shore pollution quite close to the shore. It would seem reasonable to believe that with the sewage of all the communities diverted from the river the great body of water from the lake would pass through the river without any pollution.

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It should be noted that any further step in the process of partial purification, if this should be found necessary to diminish load on the water purification plants, would place the diversion project in a very favorable position from a financial standpoint.

Deep Tunnel and Canal Project

The writer in making a preliminary study of the sewage disposal problem of the Niagara frontier for the Pure Water Committee of the Tonawanda Chamber of Commerce has developed a plan for a marginal sewer in a deep tunnel extending from Tonawanda to Lake Ontario. There exists at the present time the Old Erie Canal running along the margin of the Niagara River from Buffalo to Tonawanda, and now substantially abandoned as a canal. The new Barge Canal Route utilizes the river from Buffalo to the mouth of the Tonawanda Creek at Tonawanda. At present, a part of the sewage of the city of Buffalo enters the canal, including the Hertel Avenue trunk sewer. This canal would be utilized as a drainage canal from Buffalo to Tonawanda, where it would drop about 275 feet into the tunnel and develop water power. A similar development may be carried out at La Salle at Cayuga Creek outlet. The tunnel would be about 21 miles in length and of sufficient capacity to dilute the sewage in accordance with the standards required. Increased dilution is secured at intervals along the route by this project and thus ample provision made to avoid the creation of nuisance along the route or at the lake. Accurate figures of cost can be made only after extensive surveys and borings and detail designs. Assuming that the tunnel is in rock, a tunnel 30 feet in diameter could probably be constructed for \$125 per foot, or a total cost of about \$13,000,000 for the tunnel. Changes at the cities to make connections with canal and tunnel for the existing sewerage systems, and power houses,

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machinery, etc., would cost about \$7,000,000 additional, or a total of \$20,000,000 for the entire project.

WATER POWER DEVELOPMENT

Assuming a diversion of 4,000 cubic feet per second representing a dilution of 4 cubic feet for each 1,000 of population and based on a total population of 1,000,000 a head of 275 feet, and an efficiency of 80 per cent on the turbines, we get a total of 100,000 horse power.

Distributing this over the entire cost of the project which we have seen, maybe as high as \$20,000,000, would give a cost of $\frac{2,000,000}{100,000} = \$200$ per horse power.

Since this power may be ultimately sold under a 40 per cent load factor and to the extent of about 200,000 horse power on this basis, we would have $\frac{2,000,000}{200,000} = \$100$ per horse power delivered to consumers for the cost of the entire project.

PROBABLE YEARLY COST FOR POWER DEVELOPMENT

Interest on \$20,000,000 at $4\frac{1}{2}$ per cent	\$900,000
Depreciation	200,000
Other Expenditures	250,000
Sinking Fund at 4 per cent	132,000
Total	<u>\$1,482,000</u>

Cost per horse power reckoned as twenty-four hour, seven day power, $\frac{1,482,000}{100,000} = \$14.82$ per horse power per year, or if reckoned on eleven hours per week day, or under a 40 per cent load factor, the cost would be about \$7.50.

The full income would not, of course, be attained for several years. These figures are approximate and are only given because they indicate the financial advantages possible in comparison with a sewage treatment project.

A large part of the profit on the investment would be

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indirect, resulting from the more rapid growth of the cities due to power development, and consequent employment of more men and building up of industrial communities.

This solution is attractive because it would accomplish two most desirable things, — the diversion of sewage from the river and income to carry the financial burden of the project.

Whatever method is adopted should be undertaken under state or federal regulation. It would be possible, however, to form all the municipalities and towns within the area to be served into a sanitary district, in the same manner as was adopted at Chicago in carrying out the Chicago Drainage Canal project.

PUBLIC RESERVATION OF RIVER FRONTS AS PART OF THE REGIONAL PLAN

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When our forefathers first made their way westward from the Atlantic Coast settlements, they followed the watercourses for the double reason that water offered the easiest means of transporting their supplies and that the only known trails of the Indians followed these watercourses and the portages over the watersheds. The first settlements were always made on the streams, and the settlements most advantageously located with regard to these watercourses were the ones that grew and thrived.

The river front was always the center of activity in these pioneer settlements, and continued to be as these settlements grew into cities until the middle of the last century, when our great railroad development began. The water-front development in the pioneer days was always centered around the first docks and landing stages. Near these the first warehouses were built and the first commercial life established, while the water front above and below this commercial center was settled by fishermen, boatmen and small traders; and as a commercial center grew, these other settlements were crowded up and down the river but were always of the same character.

As our railroad development grew and inland transportation facilities increased, the commercial life of these cities gradually grew away from the river fronts, and these river fronts became in most instances what they are today, — the cities' back yards, covered with rotting wharves and the wrecks of abandoned vessels and house boats, the

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dumping ground for all the cities' junk and the most disreputable and unsightly places in the city.

Both business and residential sections spread to the higher ground and the inland districts because of the lower land values and the increased transportation facilities; the public parks and recreation grounds were selected and developed in these areas for the same reasons, for when most of this park work was begun, the property along the river fronts was still considered too valuable to be devoted to public uses; but the moving away from the river fronts by both the business and social life, the erection of modern buildings and added means of inland transportation, the failure to tear down and replace the ancient structures in the older sections, have lowered the property values along these water fronts, except at a few centers where ocean commerce still clings, until now, almost without exception the greater portion of the river fronts of our cities and their suburbs can be purchased at lower prices than any other property equally accessible.

These facts and conditions of the developments of our cities have probably had a great influence in weaning the American people away from aquatic recreation, but we all love the water and consider water necessary in all our park developments; and these same cities have spent millions building artificial lakes and waterways and beautifying and improving their little inland parks and playgrounds when a like amount of energy and money would have transformed their river fronts into real recreational parks.

No portion of the terrain lends itself so readily to park and recreational development as these river fronts; even those streams most subject to flood and extreme low water can be easily and economically made useful and presentable at all stages of water. These areas are always easily accessible to both the city and the suburban sections and usually combine naturally all those attractive features which we strive to develop and introduce in our

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park work; and, too, these areas can be devoted to public uses with the least impairing of our commercial and residential life. Practically every city in the country has such a river front and all of these should be set aside and developed for public recreational uses. Docks, boat basins, bathing beaches and bathhouses should be built, refreshment stations, shelters and comfort stations provided, paths and driveways arranged, and where there is a commercial demand, presentable wharves and docks built, and these unsightly, degenerate, odious areas made useful, clean and their natural beauties restored.

Very few such developments have been attempted in this country and these few have been wonderfully successful. I am fortunate enough to have been connected with one of these developments, and to illustrate what can be done with such water fronts, I will tell you of some of the things which have been done in the Palisades Interstate Park.

The western shore of the Hudson River from Fort Lee, New Jersey, to the village of Palisades in New York, a distance of nearly twelve miles, lies under magnificent trap-rock cliffs, the Palisades. This river front had been occupied since the Revolution by a few fishermen, boatmen and men engaged in a small way in quarrying this trap rock into paving blocks which were used on the old streets in New York City. Just at the end of the last century companies were organized to exploit this rock and market it on a large scale, and these companies began opening quarries and blasting down the face of these magnificent cliffs. Public-spirited citizens at once took steps to stop this destruction and from this movement grew the Palisades Interstate Park.

This twelve miles of river front was a veritable wilderness. The shores were rock-bound and forbidding, there were no landing places save a few of the temporary docks which these fishermen and quarrymen had built, no paths under the cliffs nor along the shore, and it was utterly impos-

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sible to get through the tangled undergrowth and rock débris which covered this whole area. These rock cliffs do not rise directly from the river's edge as they appear to do when viewed from the river, but stand back in many cases 600 feet from the water's edge, and this area between the cliffs and the rivers is a talus slope formed by the disintegration of the cliffs which have taken place during the ages. This slope is heavily timbered and the soil so rich and productive that the vegetation is very rank and prolific. The water's edge was so strewn with boulders that it was almost impossible to land a small boat at any point along this shore. An investigation of the river's bottom shows hundreds of feet of soft mud within a hundred feet of the shore and the problems of constructing docks and boat basins and filling in areas for play fields presented many interesting and intricate questions.

Most of these problems have, however, been solved, until now we have constructed along this twelve miles of shore front, fourteen docks at which large river steamers can land, have built three boat basins which accommodate hundreds of motor boats and thousands of canoes and rowboats. We have made fills aggregating nearly fifty acres on which well-sodded playgrounds have been completed, have built a large number of bathing beaches, using in their construction the screenings of the quarries which have been closed, have built shelters, refreshment stands, bathhouses, comfort stations, have opened up and cleared out many picnic groves in which tables and seats have been placed and along the entire shore front, and have constructed a path protected by rough, rugged sea walls, and farther up the slope nearer the foot of the cliffs we are now constructing a driveway which will be opened within a few years and which will be, in my opinion, the most wonderful drive in the world. Farther up the river in the Highlands in New York state, the Commission now own more than 30,000 acres of beautiful wooded and

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watered mountain land. In this area they are doing much more development even than that done along the lower river front. In all this development work we have constantly striven to preserve all the natural beauties and refrain from introducing any hint of artificial adornment, feeling it our duty simply to open up, make usable and show to all the people the wonderful things nature has done for this region.

More than 55 per cent of the money which has gone into the acquisition and development of this park has been contributed by public-spirited citizens, and these contributors are delighted with the way the public is using the park and with the magnificent results already attained in improving the health, education and enjoyment of the millions of people who take advantage of the many recreational possibilities it offers.

PUBLIC RESERVATION OF RIVER FRONTS AS PART OF A REGIONAL PLAN OF DEVELOPMENT

PLAN TO ENLARGE THE STATE RESERVATION AT NIAGARA AND ESTABLISH THE NEW YORK STATE MEMORIAL RIVERWAYS AND RESERVES

ANSLEY WILCOX

One of the Commissioners of the State Reservation at Niagara

In these days, when the whole country is stirred with a desire to commemorate in some fitting way the deeds of our soldiers and sailors during the World War, now happily at an end, a wonderful opportunity is presented by the plan for extending the New York State Reservation at Niagara from its present limits to Fort Niagara and Lake Ontario in one direction, and to the city of Buffalo and practically to Lake Erie in the other direction. This would take in all the river roads on the American side, as similar roads have been incorporated in the Canadian Reservation, and by the creation of occasional small parks or reserves and lookout points along the river, it would afford unlimited opportunities for the erection of special memorials.

This is a project which interests not only the people of western New York but the whole state, and indeed the nation, and our Canadian neighbors and foreign visitors as well. Niagara Falls is probably the most widely known place in the United States, and more generally visited by tourists than any other single attraction. Residents of Buffalo, a city of half a million people, are frequently amused when traveling abroad at being asked

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whether that city is not somewhere near Niagara Falls; but this is indicative of the general interest which centers around this great cataract, and the rapids and other natural wonders grouped in the locality where we are now meeting.

The movement for the rescue of Niagara Falls from the hands of those who were spoiling its natural beauties began forty years ago. As a result of an international impulse, it was taken up and advocated by leading men from all over this country and Canada. The movement took concrete form on the two sides of the river almost simultaneously; but the Canadians had an easier job and more favorable conditions, and they have already carried their Queen Victoria Park and the improved highways leading out of it to the limits of the river in each direction.

On the New York side the first move was more difficult and far more expensive, and the New York State Reservation at Niagara has never been extended beyond its first limits. It includes, as you all know, Goat Island with Green Island and the other small isles surrounding it; also Prospect Park at the brink of the American Falls, and from that point extends in a narrow strip along the upper rapids to the intake of the Hydraulic Power Canal. This property originally cost the state of New York in 1885 about \$1,500,000, a very large sum for those days. Obstacles apparently insuperable have always prevented the further extension of the Reservation either down or up the river. But plans are now presented through which much may be accomplished.

In the meantime our men and women have fought and worked and died, through the dreadful years which are just behind us, side by side with their brethren and sisters from Canada and other British possessions, as allies of the French and Belgians and Italians and other peoples, battling for the liberties of mankind and the preservation of the civilized world. This gives a new significance to

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the idea of creating a great memorial of international importance, and establishing special memorials thereon, along the banks of the Niagara River, looking across the waters which form the boundary between us and our Canadian friends. These waters, flowing swiftly as they leave Lake Erie, and then lapsing into peacefulness, then becoming turbulent and reaching one vast cataclysm, with following stages of violent commotion, and finally melting in a great placid outflow to Lake Ontario, contain vivid suggestions of many of the events through which our peoples have recently passed and are now passing. A memorial to our soldiers and sailors of this character would attain world-wide fame; and if, following this, the two reservations along the Niagara River, American and Canadian, can be united by a great Memorial Bridge, the grand project would seem to be complete.

I shall call your attention tonight to the principal features of this plan as developed by the commissioners of the State Reservation at Niagara. We need to enlist your sympathy and support for it. The best way to do this is to refer to the provisions of the act which was introduced in the legislature last spring, and several times amended, until it is now supposed to be in good form, although, no doubt, capable of still further improvement. The act is intended to carry its own explanation and argument with it.

Section 1, entitled "Purpose," declares:

"It is the solemn purpose of the state of New York to preserve forever in sacred memory the patriotism and devotion and the great achievements of the Soldiers and Sailors from this state and the nation who served in the army and navy of the United States during the world war for freedom in the years 1917 and 1918; and as a permanent and fitting memorial thereof to enlarge the State Reservation at Niagara, and to create and add to said Reservation a system of Memorial Riverways and Reserves, extending along the Niagara River from Lake

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Erie to Lake Ontario, and connecting Fort Porter with Fort Niagara, consisting of parks and public places reserved because of their beauty and commanding position for the free use of the public, connected by north and south memorial riverways and with suitable structures thereon, all of which shall constitute such memorial."

Section 2 names the proposed extension of the State Reservation as the "New York State Memorial Riverways and Reserves"; the road northerly to Fort Niagara being "North Memorial Riverway"; and the road southerly towards Buffalo "South Memorial Riverway."

Section 3 is entitled "General Powers; Experts; Legal Advice." It provides that the commissioners of the State Reservation at Niagara are authorized and directed to make plans and procure surveys and to take necessary steps to extend the State Reservation as described, excepting lands in the cities of Tonawanda and North Tonawanda, it being the idea that the connecting roadway through those cities should be handled by the cities themselves, under plans agreed upon. The state engineer and the attorney general and the state commissioner of highways are directed to coöperate in carrying out the provisions of the act.

Section 4 declares that the commissioners may take over, in whole or in part, the present river roads extending from end to end of the Niagara River and generally close to the bank thereof, but they shall have power to widen said roads and change the location thereof, or to provide an additional road or roads nearer to the river bank, where necessary or desirable; and for this purpose they may seek and obtain the coöperation of the cities and villages through which said roads pass. The present road so included, except within said cities, shall become part of the State Reservation at Niagara, and shall be designated as a state highway, and constructed and maintained as other state highways are constructed and maintained; but the commissioners shall have authority to

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protect and beautify the said roads and to preserve the same in all parts as beautiful parkways or riverways.

Section 5 is as follows: "Acquisition and Improvement of Parks and Reserves. The said commissioners may also acquire tracts of land, of greater or less extent, of natural beauty and commanding position, lying between the said main river roads and the bank of Niagara River, or adjacent to said river roads on either side, to be used as public parks and reserves, to be planted with trees and shrubs where this is necessary and restored to a state of natural beauty, with interior roads furnishing access to the bank of the river and to viewpoint over the waters of the river. They shall select for this purpose suitable tracts of reasonable size, where the land can be acquired without cost or on reasonable terms. The interior roads through such reserves shall be built, maintained and controlled entirely by the commissioners of the State Reservation at Niagara."

I may insert here that, so far as yet developed, it is the intention of the commissioners to be modest in acquiring land for these purposes, and not to be hurried, but to pick up suitable tracts of land as they can advantageously be acquired and developed. My personal ideas at this moment do not go beyond one or two locations for Reserves between Buffalo and Niagara Falls, probably two Reserves between Prospect Park in Niagara Falls and Lewiston, and about two more between Lewiston and Fort Niagara; but this would be a matter for future development.

Section 6 describes the manner of acquiring land. It authorizes the commissioners from time to time to acquire land for all such purposes, including changes in the main roads, where necessary or desirable, either by gifts or grants or by conveyances, or by leases in perpetuity or for a term of years, or by licenses. "They may also acquire by condemnation . . . any land not devoted to railroad or power uses, and not held or intended for such

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uses. . . . All titles to such land, and all leases and licenses, shall be taken in the name of the State of New York."

Section 7, entitled "Appropriation," declares: "It is the purpose of the State to expend, in carrying out the provisions of this act, moneys from the general fund of the treasury not exceeding \$500,000; and the sum of \$50,000 is hereby appropriated for such purposes." This immediate appropriation would be sufficient to carry on the preliminary work for at least a year, and no other moneys would be available from the larger sum indicated in this section without a new appropriation by the legislature.

Section 8, entitled "Charge on Water Power," declares that to provide funds for the purposes of this act, in addition to the moneys authorized and appropriated, and for the improvement, maintenance and upkeep of the State Reservation at Niagara as so enlarged, and for further possible additions thereto and memorial structures thereon, a charge or rental is imposed upon the right of the Niagara Falls Power Company, its successors or assigns, or any other person or corporation, to divert waters from the Niagara River in excess of 15,100 cubic feet per second for power development, and also on all additional power acquired or developed by any person or corporation as a result of the new legislation in 1918 authorizing the consolidation of existing power companies. Such charge or rental is fixed in the act as it now stands at the rate of fifty cents per horse power per annum for each additional horse power acquired or generated and developed since the passage of said acts in 1918, and is to be levied from and after the first day of January, 1920. Provisions are also inserted for giving effect to this.

It is hoped and confidently expected that the moneys which will be derived from this source will be sufficient to pay the entire expenses of the improvement, maintenance and upkeep of the enlarged State Reservation, and perhaps for building some memorial structures, so that, after

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some original expenditures in the acquisition of additional land, the entire Reservation can be improved and maintained without appealing to the state for further funds.

Section 11, which was inserted as a precaution and to meet certain criticisms, declares that: "Nothing in this act contained shall in any way limit the right or power of the state to impose such other and further charge or rental for any diversion or use of the waters of the Niagara River as the legislature may direct. Nor shall anything herein contained confer upon the commissioners of the State Reservation at Niagara the right to grant any privilege for the diversion of the water of the Niagara River for power purposes, or in any way to limit any right conferred by law to divert the waters of such river for any purpose."

The insertion of this section and other changes made in the bill by late amendments were intended to remove any suspicion that this project was intended to affect or could possibly affect the question of further power developments at Niagara Falls. In view of these changes, the bill is now free from possibility of criticism in this respect. It neither favors nor opposes any power developments.

There is reason to hope that this bill will be passed by the legislature next winter; and thus will be started a great plan of regional development along the Niagara River of which we shall all be proud, and an imperishable memorial to our soldiers and sailors will be created.

RESIDENTIAL ZONING

INTRODUCTORY STATEMENT

ARTHUR C. COMEY
City Planner, Cambridge, Mass.

I propose to conduct at least a part of this meeting as a forum for the purpose of getting a clearer conception of residential districting. The human element is of course a feature of any districting, and planning must not be confined to the physical aspects of the city, although residential districting is also a protection to the physical city. Property values follow closely human values. This is one reason why districting is taking hold so rapidly, — more rapidly in fact than the park movement, for example, which made such progress in the 90's.

We have built disorderly cities, particularly in the last fifty years. On the outskirts of Buffalo we find ample evidence of disorderly growth. The destruction of residential districts by this chaotic growth is the strongest single argument for getting districting considered in most cities. New York is the exception in that there are more powerful factors that make necessary the consideration of districting, namely, industrial districts invading business districts.

Today as we came down Delaware Avenue, a street largely built up with fine single houses, set well back, we saw a large pile of lumber and we were told that somebody proposed to put up a large frame apartment house. In a few years this apartment house would become, in the ordinary course, a poor kind of tenement house, and property values along the street would soon be destroyed.

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Before anything like this is allowed thorough investigation should be made to determine the decrease of property value by a building of this kind.

In Massachusetts, as there was some question whether districting could be done under the constitutional limitations, we passed a constitutional amendment under which there can be restrictions on apartment building. Mr. Purdy has indicated how apartments can be eliminated by the indirect method of restricting the height of buildings and the area of lots which can be used for building purposes. New York City was the pioneer to adopt districting before public opinion backed it, and therefore did not adopt the direct method of specifically preventing apartment houses in residential districts. The last few years have given us many examples of the excellent working out of such methods. In Cambridge we are seeking to limit heights of residential buildings to two stories and you can't very well build a tenement only two stories high that will pay. Buffalo should adopt the direct method, and in Massachusetts I believe the direct method of dividing the city into districts for apartments and districts for other houses only, is the best method of carrying out districting.

Apartment houses and multi-family houses should be assigned to specified districts, and single family houses should be in districts which have adequate protection against apartment houses. The single family house does not damage apartment dwellings, so that the only requirement necessary is to establish residential districts where apartments are not permitted.

In extending districts out into the surrounding country you have a different problem. In an old city you cannot tear down buildings, but in a new city or a new part you can determine in advance what is to be a residential district, a business district, an apartment house district, a single and two family house district.

There are a number of special problems in residential

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districting and one of them is the garage. The New York method of dealing with this may be excellent in theory, but it is not practical for most cities, since we cannot rely upon the permanent and successful administration of a law which permits appeals to city officials. Even the practice of not allowing garages for over four cars is not successful, and although experience elsewhere is a good enough general guide it must be modified and adapted to each city.

The paramount importance of residential districting is apparent when one realizes that residences constitute about four-fifths of the buildings of the city.

ZONING IN PRACTICE

CHARLES H. CHENEY

Consultant Portland, Berkeley, Alameda City Planning Commissions

Zoning is the first fundamental step in any city to establish a practical basis for constructive city growth. Until zoning is done, no city planning commission can effectively prove its case as to the necessity for the adoption of a major street plan, or properly promote greater economy, convenience, safety, health and comfort in industrial, business or living conditions, or make the city more beautiful and attractive. Once adopted, a well worked out zone ordinance will guarantee a definite and safe place for industrial investment; protect home neighborhoods; stimulate home ownership and assure more contented labor conditions; remove much of the suspicion and uncertainty from real estate, while stabilizing property values; afford greater security for mortgage loans; form a surer basis for assessment; and provide the city for the first time with a firm foundation for the solution of the problems of congestion, traffic, paving, sewers, public utilities, housing, schools and recreation.

We cannot discuss residential zoning, the subject originally assigned for this paper, without first considering its objects, with relation to industry and retail business. From practical experience in several cities, we find that the best way to draw boundaries of residence districts is to work out first the business and industrial boundaries — what is left will naturally form the residential zones. But before going into detail I want to lay before you in contrast the several kinds of protections which we must provide, from the point of view of industry, the worker, the real estate investors and the ordinary home owner.

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In the fall of 1918, with the war shipbuilding industry at its height, the Emergency Fleet Corporation and the War Industries Board had to serve notice on many cities of this country that unless adequate housing were provided for ship workers and munition employees, where they could live contentedly, large contracts might be taken away and new ones diverted to those centers which could meet these requirements.

Industries Must Have Contented Home Conditions for Employees

Up to this time the matter of contentment of employees had not been taken into account so seriously, nor was its relative importance to industry so well understood. But when the labor turnover in shipyards on both seacoasts ran as high as 1,100 per cent, or one new man for nearly every job in the yard each month, it became evident that the state of contentment, or discontent of the men, which caused their shifting about in such great numbers, was worth analyzing to find, if possible, some practical remedy. That a decent house must be furnished for every married man (and approximately 60 per cent of the industrial workers in Portland and other coast cities were married or had dependents), and that a comfortable place must be provided for single men, became a principle accepted by industries and the business world as an economic as well as a social problem, to be solved as a necessary part of each business undertaking.¹ Labor managers show that more than half of their employees being married, the preference is given to married men when a let-out comes. Married men are naturally inclined to stick on the job, and in the long run are considered more reliable than the single men, who think they can afford to be floaters and drift

¹ See "Labor Turnover," by "Professor George J. Eberle, of the University of Wisconsin, in "American Economic Review," March, 1919.

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from yard to yard. The married workers have an average of four other dependents, and the permanent location of this family of five in any city has direct bearing on the prosperity of neighborhood and downtown stores, and of the community in general.

In providing housing for industrial workers it was found that contentment depends also on municipal regulations for the protection of home neighborhoods. Aside from the difficulties of getting a home at a price or on terms that workers can pay, we found in Portland,¹ Alameda and Los Angeles that many such men though inclined to acquire homes, were afraid to do so for fear some one later would ruin their investment and home neighborhood by building an apartment, stable, laundry or public garage next door. Big industries and business men therefore have good reason to work for the establishment of protected residential zones as a definite encouragement to home ownership and to more stable labor conditions.

Demand Protected Home Neighborhoods for the Poor as Well as for the Rich

Labor leaders see this from another point of view. When the new act permitting the zoning of all cities in Oregon was up for final passage last March in the state legislature, some misunderstandings of it were expressed, to which I heard the acknowledged union labor leader in the House retort hotly, "You rich men live in protected and privately restricted home neighborhoods and let all the stables and public garages and other dirty businesses intrude into any block of the workers' home neighborhoods, to spoil all that they work and live for." (The bill was passed.)²

¹ For a more complete statement of findings in Portland see "Zoning and City Planning for Portland, Oregon," published by the City Planning Commission, June, 1919.

² Chapter 300, Oregon Statutes for 1919, effective May 19, 1919. It is identical with the California Act and similar to the New York and New Jersey Acts.

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Industries Must Have a Safe Place to Invest

Industrial plants, stables, warehouses, laundries, etc., are offensive neighbors in home sections, so much so in fact that cities all over the country are excluding them by ordinance from residence districts. But we must have industries, and they are entitled to a safe place, officially established, where they can put in every investment necessary to meet competition, and be secure from the protest and annoyance of residences adjoining. The small home owner, the tenement or apartment, the cheap hotel, are continually preying upon the need of adjoining industries to expand and buy them out, meanwhile making no repairs and permitting slum conditions to develop. Any one who has looked over the industrial sections of a number of cities will recall that the slums are generally on the edge of the factory district, where uncertainty of the future use of property has made low rents and an influx of down-and-outers.

Close students of city development know that there is an increasingly large migration of industrial plants, both in America and in England, out of the cities into the country. If we fail to act promptly in establishing a safe place in the city limits, cities are liable to lose most of them altogether in the next decade.

We have found in Portland and elsewhere that a large proportion of our industries today have to do business on a residential basis, that is the small residence owners surrounding the plants refuse to be taxed for wide, heavy hauling pavements, extra large sewers for industrial wastes or for high pressure mains for extra fire protection, and protest loudly enough to block needed spur tracks in the sidewalks, elevated sidewalks for deliveries, and other

¹ For more complete statement of reasons see "Report of the Commission on Building Districts and Restrictions, New York City, 1916," also "Zoning and City Planning for Portland, 1919," and "Zoning for St. Louis, 1918." Printed copies of the Alameda and other ordinances can generally be had on application to the City Clerk at the City Hall.

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modern facilities necessary to a live modern business, that has to compete with more favorably located manufacturers not similarly held back.

To put their industries on a competing basis and avoid these drawbacks, Alameda and some cities have established industrial zones in which no new permits to build residences will be granted. This seems to be the only effectual method possible to prevent factories from being driven entirely from our cities. A place must be made for them where they will feel safe in putting in their heavy investments or these investments will not be made. The chief engineer of the city of New York, Mr. Nelson P. Lewis, says that the prohibition of residences in industrial zones is one of the most important protections to put in a zone ordinance. He recently recommended it to the Illinois state legislature to be included in its new State Zoning Act.

Removing the Suspicion and Uncertainty from Real Estate

Suspicion of real estate as an investment, on the part of the general public, has been prevalent for the past ten years, in fact pretty generally so since the panic of 1907. Tabulations of the losses incurred in the various cities of this country and Canada are only beginning to be available, but sufficient evidence exists to show that a number of the main causes of suspicion and uncertainty can be removed.

So many agents in different cities have told me of having the following experience that it seems well-nigh universal. An agent sells an investor income-bearing property in a seemingly good location. Next month or next year the adjoining property is acquired by a new owner, who turns it into an undertaking parlor, a laundry or a public garage, or builds an overhigh building on it, cutting off adjoining light and air, thereby depreciating the rental returns of the first investor and of other near-by properties.

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The real estate agent is then blamed, and most unjustly so, for having advised the first purchase. In other words, there is no stability to real estate in most cities because of the lack of regulations to prevent undesirable uses of property from encroaching in the same block with good residence, good apartment or good business income-bearing property. Investors, banks and mortgage loan companies, as well as the small home owner, the renter, and both capital and labor have therefore recently become vitally interested in having sensible zone ordinances passed that will stabilize real estate values and remove suspicion and uncertainty from them.

The Form of Zone Ordinances Now Being Adopted

It is for such reasons that zone ordinances have now been adopted in cities of all sizes and kinds throughout the country, including Los Angeles in 1909 (population 561,000); New York City in 1916 (population 5,750,000); St. Louis in 1918 (population 780,000); Alameda in 1919 (population 32,000) and Palo Alto in 1918 (population 6,000). These ordinances have been presumably adapted to fit the special needs of each of these cities, but as a matter of fact it is well known that the earlier ordinances at least are largely a matter of compromise between what was needed and such opposition, mistaken or otherwise, as developed at the time of passage.

Obviously it is the duty of the City Planning Commission to do its whole job by proposing a zoning plan that will give all the protection needed to all kinds of building development and property in the same ordinance. We recognize that legally as few classifications or distinctions as possible are advisable in a zone ordinance, and hence we are all trying to get this number down to a minimum. But each city has its own requirements and natural tendencies of growth which must be carefully taken into account and provided for.

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Zoning discussions were started in Portland, Alameda, Palo Alto, Berkeley, Fresno and other cities with which I have been personally familiar, by printing a standard outline ordinance, in brief form as follows, which was handed to each person present at a zone conference or meeting:

STANDARD OUTLINE OF A ZONE ORDINANCE

Three kinds of districts will have to be established.

USE DISTRICTS are necessary to prevent the scattering and intrusion of inappropriate and destructive uses of property, which make uncertain and decrease property values and for other reasons stated below.

HEIGHT DISTRICTS are necessary to maintain proper light and air and for economic reasons. Thomas Adams says: "In our Canadian cities the skyscraper is the stepbrother to the vacant lot, only that for every skyscraper there are probably a hundred or more vacant lots. This is an unhealthy and uneconomic condition and is causing us to try to get a more even and less scattered form of development by restricting the use and height of buildings."

AREA DISTRICTS are necessary to prevent overcrowding and for the protection of residence neighborhoods particularly.

The establishment of use districts alone would not fully accomplish the protection sought. Height and area district regulations are equally necessary to prevent congestion and to secure light and air. Each is an inseparable supplement of the others. As long ago as 1909 the United States Supreme Court upheld the city of Boston in its right to establish a lower height limit for outside residence districts and a higher limit for downtown business districts.¹

The degree of use, height and area district regulations necessary will vary according to locality, tendencies of

¹ Welch *vs.* Swasey, 214 U. S. 91; 29 Sup. Ct. 567, decided May 17, 1909.

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development and natural conditions. This ordinance would apply to new building permits only — existing buildings and uses not to be affected.

Amendment to the ordinance will be necessary from time to time, to meet the growth of the city. No ordinance can be passed that cannot be amended.

The use districts apparently necessary are as follows:

Residence Districts of

* Class I. Single family dwelling only.

Class II. Dwellings, flats, clubs, dormitories, apartment houses, hotels without stores, railroad shelter stations.

Business and Public Use Districts of

Class III. Retail businesses, trades and professions, railroad passenger stations, including residences of Classes I and II.

Class IV. Schools, public and semi-public buildings, churches, playgrounds, greenhouses, parks, cemeteries, including single family dwellings.

Class V. Retail business of Class III, plus public garages, dyeing and cleaning, undertaking parlors, wholesale business, oil supply stations, railroad freight stations and sheds, including any residence, business or public use of Classes I, II, III or IV.

Class VI. Hospitals, sanitariums, charitable institutions, including any kind of residence of Classes I and II.

Industrial Districts of

Class VII. Ordinary, not obnoxious factories, warehouses and industries, including any business use, but permitting no new residences of any kind.

Class VIII. Obnoxious and odor producing factories, including any kind of business use, but permitting no new residences of any kind.

Height districts necessary seem to be (they may cover a number of different classes of use districts):

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2½-story districts. Limited to a maximum of 2 stories and finished attic not to exceed a total height of 35 feet to finished ceiling line of attic floor, above the curb.

4-story districts. 4 stories not to exceed 50 feet.

6-story districts. 6 stories not to exceed 70 feet.

8-story districts. 8 stories not to exceed 90 feet.

Other height districts, if found advisable.

These height limits would apply only to new building permits.

Two classes of area districts seem to be necessary for the protection of the residence districts:

A districts. Rear yard minimum depth at any level equal to $\frac{1}{3}$ height of building. Residences not to cover more than 65 per cent of lot.

B districts. All buildings to be detached and rear yards to have a minimum depth equal to $\frac{5}{12}$ of the height of the building. Residences not to cover more than 40 per cent of the lot on the ground floor, nor more than 30 per cent above.

(Note.—In cities or states where little or no housing laws have been adopted it is often advisable to have further area classifications, as in the ordinances of New York City, St. Louis, etc.)

This standard list is equally useful in a large or a small city, to start discussions with. Not all these classifications always prove necessary or advisable in the final ordinance; thus in Palo Alto the city decided not to have any Class VIII districts inside the city limits, and had need of only two classes of height districts—two and a half and four stories.

On the whole, however, the above is the lowest number of classes of use districts feasible to cover all the zoning problems of any city of size. It seems the minimum possible between the three very broad classes in the New York ordinance, and the twenty-seven classes in the Berkeley ordinance of 1916. As will be seen, it consists of two resi-

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dence classes, two general business classes, two special business classes and two kinds of industrial classes.

The reasons for having these classes are as follows:

USE DISTRICTS

Residence Districts of Class I—Single Family Dwellings Only.—In most American cities, excepting New York City, San Francisco and possibly Chicago, 50 to 90 per cent of all buildings are used as single family dwellings. This is the measure of the home and home ownership, the backbone of our nation, whom from all points of view—economic, social or moral—it is our most imperative duty to foster and protect. God grant we shall always keep them foremost in our minds in whatever zones or plans we make.

Eighty-two per cent of all the buildings in Portland (population 325,000) are single family dwellings. In a suburban city like Berkeley I found by actual count over ninety per cent single family dwellings, with almost the same proportion in Alameda. Evidently the job of the city planning commission was to protect these great numbers of blocks of home owners from the invasion of flats and apartments, with their renter and floater population, as well as from business and industrial buildings. Even if only a few blocks need this protection the classification must be put in the ordinance. We need flats and apartments, but not scattered through every block of the city to discourage and make less desirable the home of the most important social unit, which is a single family, living and developing by itself.

Once a block of homes is invaded by flats or apartments, few new single family dwellings ever go in afterwards. It is marked, "on the toboggan," the land adjoining is forever after held on a speculative basis in the hope that it may all become commercially remunerative, generally without thought of the great majority of adjoining owners who have invested for a home and home neighborhood only.

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A prospective buyer will go down a block looking for a home or home-site, and if there be one building in the block that is a flat or apartment, or even looks like one, this buyer, nine times out of ten, moves to a neighborhood where the neighbors will all be of the same home class, so I am told by real estate agents. It is instinctive.¹

Berkeley has established a number of districts of Class I in the piecemeal zoning done since 1916 (a method which is not recommended). St. Louis established a few blocks in Class I in its ordinance of 1918. In Alameda, about half the total area of the city was put into Class I; however, this included three-fourths of the built-up districts. In Portland about three-fourths of the total area of the city has asked to be put into Class I, and I believe will be so established.

Residence Districts of Class II—Single Family Dwellings, Flats, Clubs, Apartments and Hotels.—This is the general broad residence classification necessary for the older districts around the heart of the city, and for the traffic or car-line streets in outlying sections, on which we find, from our use of property maps, that most of the flats and apartments build up. The renter class which occupy these dwellings have few children on whose account to be afraid of the traffic and cars, and they seem generally to prefer to be able to step from their door right on a street car going downtown.

In Portland we find approximately one flat, apartment or hotel for each eighteen single family dwellings—in other words, 6 per cent of the area allowed for all types of dwellings is all that is naturally required for Class II uses. To throw much more than this proportion of the city's area into Class II is therefore an unnecessary setback to home ownership, as this proportion is all the city has been able to absorb.

¹ Professor H. B. Hastings of Reed College has had students plot the dates of construction and uses of all buildings in a large area of Portland, and the tabulated results bear this out.

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Business and Public Use Districts of

Class III. Retail business, trades and professions, and railroad passenger stations, including residences of Classes I and II.

Class V. Retail business of Class III, plus public garages, dyeing and cleaning, undertaking parlors, wholesale business, oil supply stations and railroad freight depots and sheds, including any residence, business or public use of Classes I, II, III or IV.

These two classes combined cover all the ordinary mercantile pursuits, and together correspond to the single business class established in New York, St. Louis and elsewhere.

Retail owners, however, tell us that it hurts their business to have a public garage, an undertaking parlor, dyeing and cleaning works or other business of Class V next to them. The ordinary store, bank or office building, undoubtedly is damaged if this is permitted. Garages and Class V businesses generally seek the side streets and the lesser rents, but once in a while one gets into a strictly retail block and either destroys the rents on that side of the street, or else holds back a district properly belonging to retailers, who would be glad to pay the higher rents. We believe on the Pacific Coast that the retailers are entitled to protection against this and we are giving it to them by the establishment of a few limited centers of Class III, with nearly always a few adjoining blocks in Class V, because we need the garages and other Class V businesses at these centers as well.

Small retail business centers are necessary about every half mile across town for the convenience of residence neighborhoods, and here public garages should be permitted. These small centers we have generally put into Class V without distinction, except where the district became a number of blocks in extent.

One of the commonest fallacies of real estate developers and speculators has been the attempt to shoe-string busi-

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ness, in outlying districts particularly, for miles along the main traffic arteries. Comparison of use of property maps, showing existing buildings in several cities, should quickly convince any one of this. In drawing the boundaries of these neighborhood business districts we have tried to hold down the amount of vacant property thrown into Classes III or V to a total of two or three times the business that may be expected to be done there within ten or fifteen years.

It is the object of zoning to remove uncertainty and to stabilize as much property as possible. In Portland we find that there now exists one store for every sixty people in these outlying neighborhoods; in other words, for each new store business that can come into a neighborhood, and keep going, there must be at least an average of twelve new families.¹ These neighborhood storekeepers tell us that they do 80 per cent of their business with families within five or six blocks of the store. When these adjoining five or six blocks are already 80 to 90 per cent built up it is obviously impossible to anticipate a great increase in the amount of new stores that can succeed in such a district, and to throw more than two or three times the existing store property into a business district at such a point simply means a lot of property held many years in uncertainty. The income from this property in the meantime, if improved with flats, apartments or dwellings, might well pay handsomely, instead of being a burden, held out of use.

After property owners' eyes are once opened to these facts we find them much more anxious to have property on traffic streets put into Class II for flats and apartments, unless they immediately adjoin an established local neighborhood business center; also because real estate men can easily prove that flats and apartments without

¹ Sixty people, of course, cannot be counted upon to furnish enough business to keep any well-stocked store alive—there should be nearer a hundred people to each store.

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stores underneath generally bring in better rentals than those with stores below—often considerably better than the small store rents of the ordinary one-story neighborhood store building. We have established many small Class V districts in new neighborhoods, comprising as little as four corners, each 100 feet square, with an adjoining block or two of the traffic streets in Class II, and then many blocks in Class I.

The following figures are interesting in giving the relative number of existing business firms and institutions in coast cities, classified according to our standard list, though most of these cities are not yet zoned:

COMPARISON OF EXISTING BUSINESS IN PACIFIC COAST CITIES¹

City	San Francisco	Los Angeles	Seattle	Portland	Oakland and East Bay ²	Sacramento
Date Counted	1918	1917	1918	1916	1918	1918
Population	568,600	561,050	363,700	272,500	314,050	57,955
Class III Uses (Department stores, hotels, offices, retail, banks, theaters and clubs)	20,569	17,399	8,072	8,106	7,002	2,003
Class V Uses (Wholesale business workshops, public garages and stables, storage houses, railroad stations)	2,041	1,688	1,529	560	616	404
Class IV Uses (Fire and police stations, religious and educational institutions, parks, large clubs)	457	752	417	441	396	105
Class VI Uses (Homes, hospitals)	51	71	29	36	40	9
Classes VII and VIII Uses (Manufacturing, yards, storage, power houses, R.R. Yards)	835	1,047	446	431	474	141

¹ Compiled by the writer from counts made available through the courtesy of the Pacific Telephone and Telegraph Co.

² Comprising Oakland, Berkeley, Alameda, Emeryville, Piedmont, San Leandro and Albany.

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The relative proportion of each class to the whole, it will be noticed, is approximately the same in all of these cities. It is not weight of numbers, but rather the relative effect of the various uses of property that counts, and where we may permit them to locate, particularly the objectionable uses, so that they will do the least damage to others.

Business and Public Use Districts of

Class IV. Schools, public and semi-public buildings, churches, playgrounds, greenhouses, parks, cemeteries, including single family dwellings.

Class VI. Hospitals, sanitariums, charitable institutions, including any kind of residence of Classes I or II.

These two special classes of business and public use districts are necessary to meet a widespread complaint, which we believe justified, that if these types of buildings are allowed to locate indiscriminately and without warning, they very often injure ten or more adjoining property owners to the benefit of the one. Even though they represent considerable groups in their public or semi-public capacity, it is certainly unfair to allow them to do any more damage to the desirability of a neighborhood or to its property and rental values than is necessary. We need these buildings and institutions, but it is certain they will do the least damage if limited to a few well located centers. In the case of schools and churches, the neighborhood should certainly be consulted before they are granted a permit to build.

In practice we have established in Alameda, Berkeley, Palo Alto and other cities, nearly every piece of property existing in a Class IV use, as a definite district of Class IV, so that alterations and additions may be made, but require each new building of such use to have an amendment of the ordinance, with a hearing of the neighborhood, before going ahead.

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As pointed out by retail business men, public buildings, schools, churches and other Class IV uses block the path of retail business. They are "deadheads" as far as customers are concerned. To cover this we have excluded Class IV uses from the Class III business districts.

Class VI districts, for hospitals and charitable institutions, are a serious problem. Existence of these buildings makes it difficult to dispose of the adjoining property without very considerable loss of values or rents. I find the assessor in Portland and in other cities reducing at least 10 per cent the assessment of all property adjoining within a block, when a new hospital is built. This totals a loss in taxable returns to the city often of a much greater amount than the value of the new hospital, to say nothing of the two or three times as much loss, at actual value, to the property owners themselves.

Hospitals and sanitariums have for years invaded the best residence districts of most of our cities and have been the subject of special regulation, usually a special permit being required, approved by the City Council. This permit method is, however, very unsatisfactory to all parties concerned, both as to hospitals and as to other types of uses about which there is conflict of opinion or interest. City officials are generally glad to do away with it in favor of the fairer and surer zoning plan, which saves them much pulling and hauling.

In practice we find very few neighborhoods willing to establish permanent hospital districts of Class VI even to include existing institutions. But we must have these institutions, and the least damage is done by forming a few better located hospitals into permanent districts, and requiring new institutions of this kind to locate adjoining them.

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Industrial Districts of

Class VII. Ordinary, not obnoxious factories, warehouses and industries, including any business use, but permitting no new residences of any kind.

Class VIII. Obnoxious and odor producing factories, including any kind of business use, but permitting no new residences of any kind.

We find two objects to be fulfilled in the establishment of industrial zones.

The first is to set aside certain reasonably small parts of the city, accessible to transportation, where the city and the factory owner can jointly install those special facilities which make industries able to compete, or have an advantage over other cities and districts. These are wide, heavy hauling pavements; extra large sewers for industrial wastes; extra high pressure fire system; enlarged water mains; unlimited spur tracks in the sidewalks, if desired, or elevated sidewalks for deliveries; access to harbor or river; closing of all streets unnecessary to through traffic; high tension power lines; permanent convenient location of freight depots, team tracks and classification yards; and adjustment of street car lines to deliver employees conveniently.

It is evident that a beginning must be made somewhere in the concentration of these facilities. Neither the city nor industrial owners can afford to install them in many places, nor much in advance of their actual use, although a beginning may be made in two or three widely separated sections of the city at once.

The second object to be sought is a safe place in which industries may invest and know that they are not to be held back by small residence owners. Hence we have found it better to make our industrial districts small and compact, with few properties thrown into them until actually in industrial use, and prohibit the small home owner or the building of further residences of any kind that might

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sooner or later hold up facilities required, and smother the industries, as is now the case in so many cities.

Two Classes of Industrial Districts Necessary.—In Portland,¹ Berkeley, Alameda and other cities we have started our discussions on the requirements of the industrial zones by sending a questionnaire to every employer of ten or more workers asking what kinds of industry they can best do business adjoining and what facilities are required. These answers point out the absolute necessity for a distinction between Classes VII and VIII industrial districts, as outlined above. A food products factory cannot be next to soap works or chemical works for fear of having its product tainted. The ordinary make-up industries say they could not keep their employees if excessive odor or smoke producers be permitted next to them.

Most cities already have some kind of regulations requiring slaughterhouses, tanneries and similar industries to which there is much objection, to locate in outlying sections. Yet only a few years after they get well established there, we find them again surrounded by small home owners, who proceed to organize and sooner or later drive these industries out as nuisances. The fair and constructive way is to establish permanent zones for industries of the Class VII type on the windward side of the city and prohibit any residences therein.

Most cities have followed the lead of New York in making their zone ordinance apply to new building permits only, all existing uses and heights not in conformity with the several zones established, not being affected. This simply prevents matters from getting worse without curing flagrant existing conditions.

¹ For summary of answers and other figures see "Zoning and City Planning for Portland, Oregon, 1919," published by the City Planning Commission. A much more complete industrial survey should be made in each large city, similar to that recently completed in St. Louis by Mr. E. P. Goodrich, report of which is given in "Proceedings of the Tenth National Conference of City Planning, held at St. Louis, 1918."

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Los Angeles, on the other hand, as far back as 1909, passed a so-called retroactive zone ordinance, as to industries and nuisances in residence districts, giving laundries, brickyards and various manufacturing plants one year to get out without compensation. While drastic and undoubtedly necessary in certain cases, this type of zoning is not recommended. It has, however, been upheld as legal and proper in a number of cases, both before the California Supreme Court and the United States Supreme Court.¹

The time to prevent the driving out of industries, and losses so incurred, is before they locate. Our coast cities (and many others) are very young, just beginning to grow up. They are due to be a number of times the size they are now, with an industrial expansion I believe hardly yet dreamed of. It is not too late to begin the establishment of the right kind of permanent industrial zones in these or any other cities. Competition will very likely soon force every city serious in retaining existing industries or in securing new ones, to establish this kind of concentrated industrial zone, in which dwellings are prohibited, and where real facilities are to be found.

While we appreciate the great step forward made by New York and other large cities in establishing their "business," "residence" and "unrestricted" districts, the last, as the name implies, are simply a part of the zoning and city planning work left unfinished. There is danger to smaller cities in blindly adopting the New York, or in fact any other city's zoning regulations. Once industrial property owners understand, they are quick to demand zoning that will remove the menace of the small home owner from the industrial neighborhood and make really safe a place in which to invest and develop facilities. The "unrestricted" district of course does not do this—it merely tolerates industries, without prohibiting impediments or concentrating facilities.

¹ The most notable of these is *Hedachek vs. Sebastian*, 36 Sup. Ct. 143 (1915).

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HEIGHT LIMITS

In establishing height limits, we have adopted story height as our unit because they are absolute, and definite as a measure of congestion. Reference to street widths is variable and unfair in most cases to property interests, as that method favors the owner facing a wider street or square. To limit congestion and make a more even and fair distribution of the use of land is equally important with securing proper light and air. We have also established a maximum height limit in feet, measured to the ceiling line of the top story, instead of to the mean height of the roof, as the latter method condemns the city to flat roofs.

Two and one-half story height limits are necessary to home neighborhoods, if they are to maintain their natural tendencies of growth. In Portland we find 97.4 per cent of all existing buildings to be two and one-half stories or less in height, including approximately all the single family homes of the city; in Berkeley 98.4 per cent, and in Alameda 99.6 per cent. Most all the outlying residence districts in Portland have asked for a two and one-half story height limit.

Those who argue for a three-story height limit for residence use zones will generally be found to contemplate invading them with flats or apartments of this height. The prospective home purchaser going down a block will appraise carefully the *semblance of use* of each building. It is not a matter of esthetics or beauty at all, but one affecting seriously the desirability of the neighborhood in the mind of the purchaser. A three-story limit is prejudicial to home buyers, and where a large proportion of owners, each with a house of two and one-half stories or less, desire to maintain this home character of the neighborhood, they are entitled to do so, in our opinion. Districts already invaded by a few two-story and attic flats can even be reclaimed (as to desirability and values, we

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believe) by establishing this two and one-half story limit, which requires a pitched roof like most residences and thus preserves the semblance of single family residence use.

A three or four story height limit is the maximum advisable in the outlying districts of large cities. Families should not be permitted to pile up in apartments to a greater height for reasons of safety, convenience and health. Commercial speculators will promote higher limits for selfish reasons, but most property owners realize that two three-story buildings are worth more than one five-story building, which generally sucks all the tenants out of neighboring lower buildings, while seldom paying any large returns of itself.

A two and one-half story height limit for residence districts and a four-story limit for business districts is sufficient for small cities. Alameda and Palo Alto have adopted these limits, with a comparatively small three-story district covering Class II apartment house zones. In larger cities other height limits are established as required. The tendency in all cities at present seems to be to hold the height down as far as possible to a sensible limit that will guarantee light and air when the district is built up solid. In making any limits, we must always think of the situation as it may ultimately develop.

Methods of Determining Zone Boundaries.—One of the most important matters in all city planning work is to guard against being autocratic. Property owners naturally resent being told what they shall do with their own. All city planning commissions find that there is at first very little understanding of the necessity for zoning regulations or for the determination of a major street plan, or for other city planning steps that must be taken. Yet it is as much their duty to enlighten property owners and others directly affected as it is to secure an agreement upon an acceptable plan that can be adopted by the City Council. City councils can be expected neither to adopt plans for which no general public demand and understand-

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ing has been created by the city planning commission, nor to initiate such plans. The attitude of the city planning commission must continually be with property owners, districts and meetings, "What can we do for you?"

On the Pacific Coast we have adopted a method of working out zoning boundaries which has the double advantage of enlightening each neighborhood of the city as to what it needs, and of having the zone boundaries originate with property owners themselves, in a thoroughly democratic way. We have gone directly to each of the neighborhoods as they have naturally grown up (in Portland some twenty-eight in all) for conferences. The president of the planning commission appoints an advisory committee of five to seven representative property owners, and we sit down with this committee, in each neighborhood in turn, with our use of property map, heights of buildings map and other carefully prepared data, and they suggest where to draw the boundaries of the business, residence and industrial zones and the height and area limits needed for their proper protection. These suggestions, drawn up in a brief signed report and diagram, are read by one of the committee to his neighbors at a neighborhood zoning meeting called by the planning commission in the neighborhood schoolhouse, library or civic club, notices of which are sent by card to every building in the district, and publicly posted every two or three blocks. After careful explanations by the consultant and members of the planning commission, this report is ratified or amended, and becomes the preliminary recommendation of the neighborhood to the commission. When these committee and neighborhood meetings are finished the city planning commission pieces together the diagrams and recommendations so evolved into a general preliminary zone plan for the whole city, behind which there is already a definite demand and sentiment. After general public hearings to see if anything has been overlooked or if any readjustments are necessary, the commission can send this zone plan to the

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City Council with the knowledge that it is the plan of the property owners of the whole city, not of the commission alone, with a group in each neighborhood ready to fight for what they know they want.

This procedure is both the most scientific and the most democratic we have been able to conceive. There is danger in it, however, if the neighborhood committees are not given complete information by the consultant and representatives of the planning commission as to the data collected, and any neighborhood meeting held without thoroughly informing a few of the property owners in advance is likely to go wrong. But with caution, tact and carefully explained maps the city planning commission can in no better way find out and interpret what necessities of neighborhoods must be taken care of in the permanent city plan, as a first fundamental step of which there must always be such a comprehensive and carefully worked out zone ordinance adopted. The great thing is to let the zoning proposals originate with the property owners themselves.

Every city can show a large number of property owners who are against zoning and all other city planning proposals which are new to them, no matter how suitable or practical they may be. But take up with these same men the specific question, "Shall the city permit a laundry, a public garage or even an apartment to go next door to your house?" and the matter has a different aspect immediately. As a neighborhood affair among neighbors, which it really is, practical proposals are soon forthcoming, and generally with the profound thanks, we have found, of those most vitally concerned. I believe we have sometimes made the mistake of too much general talk and publicity, and of too little conference with neighborhoods. The genuine civic consciousness aroused at these meetings is better in effect than many years of general agitation. It creates a real understanding and demand for sensible city planning. When we have finished the zoning it will

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be easy to take up and get an agreement of a major street plan, paving program, tree-planting program, boulevard system, etc.

Success from the adoption of these methods is predicated upon the city's establishment, first, of the proper machinery, *i. e.*, a permanent city planning commission, founded by ordinance; the second, of continued adequate appropriations for the commission, by which it can employ competent help, prepare complete data maps and assume the responsibility incident to giving that real coöperative service in planning the city's growth which alone justifies the existence of a city planning department.

DISCUSSION

HARLAND BARTHOLOMEW, *Engineer. City Plan Commission, St. Louis, Missouri:*

It is extremely difficult to consider residential zoning without considerable reference to commercial and industrial zoning. The value of any zone plan lies in the fact that it is comprehensive and unified, and to attempt to separate it into its component parts, even for purposes of discussion only, seems scarcely warranted. I shall therefore make reference to residential zoning only as a component part of a city-wide zone plan.

Presumably what prompted the selection of residential zoning as a special topic of discussion is the fact that residential zoning seems to the uninformed the primary if not the only objective of any zone plan. Usually the first demand for a zone plan is prompted by the invasion or spoliation of a good residential district by a factory, apartment house or other inappropriate structure. Since residence is the highest form of property use it is but natural that it should be more susceptible to invasion and quick depreciation, particularly where all residential property is developed piecemeal and subjected to varying restrictions, all of which sooner or later expire. The

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higher the value of residential property the more liable it becomes to invasion. The need for some permanent form of protection for residential property is quite generally recognized and demanded. When it became evident that public protection for private residential property through exercise of the police power was possible, city administrations everywhere have been besieged for all manner of public regulation of private residential property. The great necessity for undertaking residential zoning only as a part of a complete city-wide zone plan is too little appreciated and realized. Unless we emphasize this necessity and advise the many cities where zoning work is prepared of the necessity for a complete zone plan we are apt soon to invite many adverse court decisions and retard the satisfactory progress that has marked the last few years.

The subject of residential zoning implies a discussion of the forms of districts, if any, to be established. When the most competent authorities on zoning hesitate to advocate the establishment of more than one general residence district in any zoning plan I hesitate to advocate much of a departure. We must bear in mind that the zoning restrictions are public and not private restrictions, and must consequently avoid any suspicion or suggestion of localism else the courts will most certainly pronounce them discriminatory and hence illegal. It does seem, however, that there is such a wide difference between districts of one-family houses and tenements that there is a sufficiently broad distinction to warrant the establishment of at least two forms of residential districts.

In St. Louis the privately restricted street has probably been developed to a greater degree than in any American city. It is not a complete success, chiefly because, being a voluntary coöperative scheme, sufficient areas are not restricted for a sufficiently great period of time to insure permanency. The insistent demand from these privately restricted streets for a one-family resi-

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dence classification under the zone ordinance persuaded the City Plan Commission so to establish them. Yet, many of the one-family house districts in St. Louis were not included in the first residence district because the presence of a two-family house or flat did not in all cases involve loss of value or change in the character of the neighborhood. The percentage of area included within the first residence districts compared to the total area of residential property in the city is proportionately small. But let an apartment or tenement invade a one or two family house neighborhood and the process of decay becomes readily apparent even to a casual observer. Is there not justification, then, for a zone law classification between the one or two family house district on the one hand and the multiple family house on the other? If we can accomplish a segregation of residential structures according to type and then regulate each type so as to insure at least desirable minimum standards of light, air and the other necessities of public health and safety, a tremendous step forward will have been made in the progress of American cities.

It has been said that the subject of residential zoning is peculiarly important since four-fifths of the area of any city is included within the residential districts. This is an incorrect statement and one which goes to show the necessity for obtaining facts even to the minutest detail in all of the zoning work. It is possible that such cities as Cambridge, Mass., or Brooklyn, New York, which are nothing more than the component parts of larger cities, might have a large percentage of their area given over to residential purposes, although even in these cities I question very much whether as much as four-fifths of their area is residential even though they happen to be the principal residential suburbs of Boston and New York respectively. Considering any self-contained city, such as St. Louis for example, it will probably be found that residential areas occupy no more than from 20 to 30 per

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cent of the city's area. A careful examination and computation of the areas given over to residence, to commerce, to industry and to public and semi-public purposes in St. Louis was made, also the respective areas for these classes of use under the zone plan. These are shown in the following table:

PRESENT USE OF PROPERTY IN ST. LOUIS AND AREA ALLOTTED FOR EACH UNDER THE ZONE PLAN

USE	PRESENT		UNDER ZONE PLAN		Per Cent of Increase
	Square Miles	Per Cent	Square Miles	Per Cent	
Commercial	1.7	2.8	4.6	7.5	170
Industrial	4.7	7.7	5.9	9.7	134
Unrestricted			5.1	8.3	
Residential	16.8	27.4	21.0	34.2	25
Public and semi-public ¹ . . .	19.9	32.3	24.8	40.3	25
Vacant	18.3	29.8			
Total	61.4	100.0	61.4	100.0	

¹ Parks, playgrounds, cemeteries, institutions, streets and alleys.

This table was made for the purpose of determining how much opportunity there was for expansion of commerce, residence and industry under the zone plan, and whether the restrictions provided for a sufficient increase in the various classes of use. From the table it will be seen that commerce and industry can both expand over an area 100 per cent greater than now occupied, while there is still room for an increase in residential territory of 25 per cent. Public and semi-public property, which comprises more property than any other form of use, can expand 25 per cent.

Any zoning program should consist of three steps: (1) determination of the facts respecting present conditions and the development of property; (2) a complete city-wide, carefully determined plan of restrictions governing height, area and use of buildings and, (3) an educational campaign for acquainting owners of property and the city at large with the general purpose of the plan,

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the nature of the restrictions and other details, so that a strong supporting public sentiment may be built up. Zoning is four-fifths a matter of fact and one-fifth a matter of skill and judgment in determining the nature of the restrictions. The more detailed a study the better the plan that will result, and the more satisfactory it will be to all concerned.

I do not sympathize with the character of zoning which attempts to fix residential districts only. This is only a small part of the general problem. If zoning is to be justified in the courts it seems to me we must recognize the fact that it is a prime necessity for the development of the entire community and not for any particular district, such as the residential district. Here is a city which has a total value of property running into several hundred millions of dollars. Naturally many millions of dollars are spent for maintenance purposes and for new public improvements. Necessarily there should be a city plan, and the larger the city the greater the investment represented and the more the need for unification of the aggregate mass. Zoning is but one part of the general city planning problem. I believe it is dangerous even to undertake zoning until there is a definite city plan which the city expects to follow. In St. Louis our zoning plan has been greatly simplified by our other city planning work, particularly the Major Street Plan, the River des Pères Plan and the Recreation Plan. Zoning should be placed before the courts primarily as merely a part of the general program of public work and city planning which any city must undertake. It should not be merely an attempt to control private property development.

One of the interesting studies made in connection with the St. Louis zone plan was the attempt to determine why so many factories were invading residential neighborhoods and apparently leaving the developed industrial districts adjacent to principal railroad routes. A chart was made of all the large industries erecting new plants in St. Louis

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during the last five years which had a structural value of over \$5,000. There were one hundred and seventy of these plants, one hundred and four of them located on property which had no railroad connections; and while many of these were in what might be generally termed industrial districts, a considerable number of them went out into the residential neighborhoods, particularly those in which the character of development is not new and where values are beginning to decline. Our explanation of this situation was that the motor truck has supplanted the switch track of the railroad. The industry which locates in a residential district now has the advantage of proximity to its labor and low cost of land which more than offsets the slightly increased cost of motor truck haul to the railroad for raw materials and manufactured products, while usually considerable money is saved in the value of the site which the industry occupies.

I should like to emphasize the necessity for publicity and educational work in any attempt to carry out a zone plan. More than one hundred lectures were given before various organizations in St. Louis, numerous public hearings were held and one hundred columns of newspaper publicity were given to the plan previous to its adoption.

After more than six months of operation under the St. Louis zoning ordinance it may be said that its value has been proved in many ways. While it is impossible to learn all of the abuses that the zone law has prevented, several cases have come to our attention, such as the prevention of a commercial building in one of the best residential sections of the city; a dog hospital in an exclusive residential district; a small iron foundry in a district occupied exclusively by working men's homes; a junk yard in a residential district; a factory at an important point on one of the main boulevards of the city and a crematory in a residential district.

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LAWSON PURDY, *New York City*:

Zoning should be carried out so that the building would increase the value of the land. When you think of it, it must be evident that no building is suitable that will not continue to be suitable as other buildings are erected. It is easily seen that when buildings cover 90 per cent of the lot, are twice as high as the street is wide, they cover the lot to such an extent that they leave no space for either light or air. If you want to see houses of this description, go into the streets in the 'twenties in New York City and see what actually happens there. In a residential district of two-story houses, and some four-story high buildings, some one erected a large building, about ten or twelve stories high, or about 125 feet high on a street which is only 60 feet wide. The first building paid especially well, as the tenants were attracted from buildings which were not fireproof. This building had light and air appropriated across the roofs of the other buildings. By and by another building came and a few others, all of which paid extremely well, being all let on a five-year basis. But before the five years expired, nearly all the buildings that were first erected were close to other buildings which had grown up on both sides, so that all windows, if there were any, had to be closed up. There were buildings to the rear and across the street. Visualize a hole 125 feet high and 60 feet wide, a narrow channel, which had become congested with traffic. As soon as these five-year leases expired the tenants left for other buildings which would temporarily give them appropriated light and air. The rent of these buildings was then reduced to about 40 cents per square foot as compared with one dollar per square foot when they had been first erected. It is obvious that such buildings are not suitable as a standard for a whole territory. In cities of Europe they do not allow indecent exposure of buildings. Once in a while some man is considerate of his neighbors so that he finishes his building on all four sides, all contrary

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to custom. What is more absurd than a building 25 feet wide, 125 feet high, with a dingy side wall, cornice cut off and the sides of unfinished brick and sometimes white-washed?

We have tried to zone New York for the future, so that no building which is erected is not suitable to be carried out in the whole block. We found a condition and a public sentiment which prevented our going as far as we could go. If you are going to do any zoning in Niagara Falls, do not take the zoning ordinance of New York City for an example.

I want you to see that in a small city you may protect distinct residence sections such as are in the boroughs of Queens, Bronx and Brooklyn. We have a number of very pretty settlements of houses that stand on lots of about forty feet in width and some wider, set back from the street-line with rows of trees along most of the streets. What could we do to protect these from the tenement houses, the garage, and a store built close to the street? First, we could protect them from the store or the factory by zoning for use, by creating business zones, residential zones, industrial zones and unrestricted zones. A residence could be built in any one of these, but the factory could not be built in the residential zone, etc. How were we to protect them against the tenement? In California they have specified in what territory should be residences and in what district should be tenements. We did not think that we could do that in New York, but we did want to protect these houses from the tenement. There is no objection to tenements providing they are finished on all sides and have plenty of air, light and access. We established area zoning, and the zoning restriction for the single family residence was that they were to be built on 30 per cent of the lot, or that only 30 per cent of the lot could be covered with a building. A house that can only cover 30 per cent of the lot is pretty well protected from neighbors. Even a multi-family building covering

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30 per cent of the lot could not interfere with the general plan, and it would have to be finished on all sides.

I have seen single family house districts, where tenement houses could not be built on the corners because of the 30 per cent provision improve greatly in appearance. You could not buy a house at the price you could have bought it two years earlier. Many people were encouraged to build and there was every prospect of beautification of this particular territory.

You can make your city better than it is now and you can protect by zoning that which is now unimpaired.

E. M. BASSETT, *New York City*:

The National Conference has been the forum where the principles and practice of zoning have been initiated and checked up. We have tried to establish zoning on the firmest possible foundation of safety. We long ago concluded that it could not progress if brought about by condemnation and payment. We considered it must be done under the police power or not at all. The police power can be invoked only for safety, health, morals and general convenience of the community. The courts cling pretty closely to the first three reasons. There must be a clear relation between the specific zoning requirement and the health, safety and morals of the community, or else the court will say that the attempted use of power is arbitrary and amounts to taking property for a public use without just compensation. The United States Supreme Court will uphold any reasonable scope of the police power that the state court will approve. Thus the United States Supreme Court upheld the brickyard and laundry cases in California, although the New York courts might not care to go so far. Just so in rate cases, what is a fair return on investment in one state may not be in another state, and the United States Supreme Court will usually follow the state court. That is not to say that every state court must follow the United States Supreme

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Court. Each city must regard the attitude of the courts of its own state, and try to keep zoning safe. To provide that only one family houses can be built in certain districts is not safe in New York State. Instead the provision should be for a limit of families per acre, or a limit of the portion of lot covered by the structure, or for something that has a relation to congestion of population. Fanciful zoning, such as prohibiting blocks of over five houses, is decidedly dangerous. When one considers that in the East and Middle West we have not yet had a decision of a high court that zoning against business is within the police power, we see more clearly that zoning regardless of health and safety considerations is premature.

THE COMMON SENSE OF CIVIC CENTERS

NELSON P. LEWIS

Chief Engineer, Board of Estimate and Apportionment, New York City

In nearly every city and town into which the gospel of city planning has penetrated there appears to have been developed an ambition to create a civic center. This is a reasonable and laudable ambition, prompted by a more or less intelligent desire to make the city or town more attractive, and to impress the visitor with its progressiveness and the high class of its citizenship. But what, we may ask, is the real purpose of a civic center? What, at any rate, was the real purpose in this or that particular town? The idea may have been started by some well-meaning individual or group ambitious for the reputation of his or their home town for public spirit, and who may have seen or read of what has been done or proposed by another city and feel that they should do something similar or better. It may have been prompted by a feeling that a civic center offers the best means for an expression of civic consciousness. This is a telling phrase and will impress many of the citizens as something that would be well worth while, and local talent is likely to be turned loose to produce something that will attract the attention of the visitor and prompt inquiries as to the identity of the individual in whose brain this conception originated. The suggestion may, perhaps, have had its origin in the desire of some one who owned a piece of land which he believed to be peculiarly well adapted for a site for a civic center and which he might sell to advantage or who more modestly suggests a site so near some of his realty holdings that the latter would be greatly enhanced in value

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if the plan were carried out. Possibly the plan may have been proposed by some one who appreciated the need of a better or more convenient arrangement of the buildings in which the public business is carried on, that would result in economy of time and effort on the part of those having occasion to visit them, while at the same time such grouping would give to the casual visitor an impression of orderliness and efficiency.

However the group idea may have originated, whether from a desire for something spectacular and a little bigger and more ornate than that of which a neighboring city could boast, a groping after an ill-defined ideal, such as the expression of civic consciousness, a hope for personal gain or a desire for order and economy, there can be no question of the great advantage of the grouping, within limits, of public buildings the functions of which have some relation to one another. If the purpose be simply to create an effective architectural group without regard to the relation of the activities to be carried on in the several buildings, the result may be inconvenience.

The words "within limits" are used advisedly. In a town, let us say, of one hundred thousand or less, it is probable that the town hall, the courthouse, the offices in which public records are kept, those in which all of the business of the town and, it may be, of the county are conducted, and even the principal library, may be brought together in a single architectural group of harmonious design, and the result may be entirely satisfactory whether considered in its relation to public convenience, beauty or dignity. It may even be possible in rare cases that the railway station, through which most of the visitors enter and leave the town, could be one of the units.

In the case of large cities, however, the concentration of all public business in a single center is not unlikely to result in positive inconvenience. Such departments as police, fire, health and education require much space and large personnel, and it would be better to provide them

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with separate buildings in other parts of the town as their relation to other branches of the city government are not very intimate.

The Cleveland plan is on a large scale and is very impressive and beautiful, but since it was conceived the growth of the city, both in population and area, has been almost spectacular, and it may be that this concentration of the public business of a million people,—for Cleveland will soon reach that size,—will prove inconvenient, particularly in view of the fact that city, county and federal buildings, as well as the principal railway station, are brought into the group. It should be noted, however, that there are few if any other places where the railway station, here located on the lake front at a level much below that of the great plaza, could be so successfully included in the group plan.

It would be well for us to turn back occasionally to Ebenezer Howard's little book of twenty years ago, "Garden Cities of Tomorrow," which may be said to have given its impetus to the Garden City movement in Great Britain, and note his protest against overconcentration and his plea for decentralization of urban population. It may not appeal to the average American who has a passion for the biggest or the richest or whose idea of the expression of civic consciousness is to erect a building costing so many hundreds of thousands or even so many millions of dollars in which so many hundreds or even thousands of city employees are housed, but it should make a strong appeal to those knowing intimately the towns of moderate size which are fortunate enough to have had their beginning about a New England village green. If Mr. Howard's idea of groups of such units, intimately connected with one another by transit lines and constituting a great metropolitan district, could be realized, our very large cities would be more attractive and livable, even though they might not so greatly impress the stranger by their dense crowds and obvious wealth.

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There are very exceptional cases where the caution against concentration of the public buildings would not apply, such as the National Capitol at Washington. This city has but one purpose and one industry, which is government, and it has suffered greatly from failure to adhere to the great conception of its original plan, which included the harmonious grouping of the public buildings along the axis passing through the Capitol building and the Washington Monument.

But we are considering towns and cities and not a few great seats of national governments.

A very superficial examination of the great number of schemes for civic centers which have been proposed, the much smaller number which have been adopted and the very few which have been carried out in whole or in part lead to the conclusion that they were begun too late and that they should have been a part of the original plan. But on what scale should provision be made for them in such original plans? The ultimate growth in population and the territorial expansion of a city cannot be predicted many years in advance, but if the caution against over-centralization be accepted as wise, it would be prudent to make provision for one principal administrative center and for other subordinate centers. Not that a definite group plan or plans should be determined in this early stage of the town's growth, but that the skeleton plan of the town should be so designed as to make it possible to establish additional centers when needed, conveniently located with respect to a system of arterial thoroughfares affording easy communication with the principal center and with each other, and permitting the buildings composing them to be seen to advantage so that one inquiring his way need not be told to go four blocks in one direction, turn to the right and go six blocks, turn to the left and go four blocks more to the buildings on the right with columns or a dome or with a monument in front of it which cannot be seen until it is reached. It is not even necessary

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that the sites for such buildings be acquired at an early date. The greatest item of cost in creating a principal or secondary center after the town is well built up is not always the acquisition of the site but the rearrangement of the street system and the provision of suitable approaches.

But this discussion may be considered somewhat academic in view of the fact that most cities interested in the subject are confronted with the problem of finding a remedy for conditions which have already developed through lack of foresight or by reason of a development which the most optimistic boomer of the last generation could not have foreseen or conditions which have now become acute. It may not be unprofitable to review some of the attempts to arrange or rearrange public buildings, not as a civic center is commonly understood, but in a manner to make possible the more convenient conduct of public business and at the same time to give more of an impression of orderliness and dignity. These efforts, it is admitted, may afford an example of what to avoid rather than to offer any constructive suggestions to those now struggling with the problem.

New York City had a triangular area about 1,000 feet in length with a base of some 700 feet in the center of which was placed its city hall, a charming building begun in 1808 and completed in 1811. Within this same space, just east of the city hall, was located a prison, afterward converted into a hall of records and then into a home for the city court, for which it is still used. Directly back of the city hall was an almshouse. In 1867 the city very unwisely surrendered to the federal government the apex of the triangle at the junction of Broadway and Park Row for a federal building to accommodate the post office and the United States courts. The price was \$500,000 but its value at the present time is very much greater. About 1870 it built a county courthouse along the base of the triangle, immediately in the rear of the city hall,

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where the almshouse once stood. In what is still called City Hall Park we have now the beautiful city hall almost surrounded and partly hidden by a group of ugly buildings. Efforts are now being made to restore this park to its original shape, size and purpose, minus the jail and the almshouse. A handsome new hall of records has been erected on the north side of Chambers Street, fronting the easterly end of City Hall Park, and, while the city authorities were discussing the advisability of acquiring the remainder of the property facing the park on this side in order that a group of public buildings similar in design to the hall of records might form a real civic center, a fifteen-story bank and office building was erected in the middle of this space. To the east a great municipal office building, twenty-five stories in height with fifteen stories more in its tower, has been built on an irregular site spanning Chambers Street, which passes under it. After much discussion concerning a suitable location for a new courthouse, which it was at one time urged should be placed in the City Hall Park, a Courthouse Board was elected by a special statute enacted in 1903 and a site was selected and acquired in close proximity to the city hall and the municipal building. A competition was arranged, and the design accepted by the board was for a circular building having a diameter of 386 feet and a height of 204 feet above the street level with eight stories on the front and thirteen stories in the central court. It would be surrounded by quite generous open spaces but would not be approached by a single street radial to it, all being approximately tangential, so that no satisfying view of the building would be afforded those approaching it. Title to the site was taken in 1913, the buildings were removed and the site is still a waste place, though during the latter part of the war and up to the present time it has been partially occupied by barracks for a provost guard. The cost of acquiring this site was nearly \$12,000,000 and the interest charges amount to about \$1,480 a day, to say

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nothing of the loss of taxes. Bills have been annually introduced in the legislature providing for the abolition of the Courthouse Board and conferring its powers on the Board of Estimate and Apportionment. Such a bill was passed by the legislature of 1919, and has recently become a law. The sale of the site has been urged, while in view of the present acute shortage of residential building it has even been proposed that the city erect on this space moderate priced apartment houses. The difficult problem of cleaning up the City Hall Park by the removal of the post office, the county courthouse and the city court and its restoration as a site for the one little building occupying its center, and as a green oasis in the surrounding wilderness of skyscrapers, still remains with us.

While the creation of what is commonly known as a civic center in the borough of Manhattan, in or about which might be placed even the more important buildings, is now realized to be not only impracticable but unwise, the brief outline of the fate of the City Hall Park through the surrender of space which should have been jealously preserved affords an excellent example of what not to do.

Another illustration of the need of a fixed and intelligent policy with respect to public buildings is to be found in the same city but on the other side of the East River in the borough of Brooklyn. The city hall of the former city of Brooklyn, now the Borough Hall, is also located in a triangular space, much smaller than that of New York, with a length of about 400 feet and a base of 300 feet. Here also on the other side of the street forming the base of the triangle were located the county courthouse, the hall of records and the municipal office building. The hall of records is a relatively new building; the courthouse has recently been remodeled and made very satisfactory, except for the lack of space about it, while the municipal office building was ill-arranged and wholly inadequate. Adjoining the last named was a vacant space

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acquired some years ago in order that the group of public buildings might be extended.

In 1903 it was decided to erect a new municipal building. A competition was arranged and an architect was selected. In January, 1904, a new borough administration came into office. The accepted plans for the municipal office building did not commend themselves to the new officials and other architects were employed to prepare new plans. The displaced architect had meanwhile died, but his estate sued the city and recovered for fees and breach of contract. New plans were prepared, involving a slight change in location, but before funds for building operations were available another borough administration came into being in January, 1906, and the second plans and architect No. 2 were thrown into the discard and a third architect was engaged. Quite naturally architect No. 2 brought suit for fees, breach of contract and wounded feelings and, as a matter of course, he also recovered. This administration, unlike the two preceding it, was elected for a term of four years and it seemed as if a start would surely be made this time. Four years, however, seems to be a very short time for some things, among them the final selection of plans and the making of a contract for a public building for which two sets of plans have already been made and, owing to the lack of sufficient funds and other reasons presumably good and sufficient, the four years slipped by before the contract stage had been reached. With the year 1910, administration No. 4 came in and, with entire loyalty to precedent, concluded that neither plans nor architects Nos. 1, 2 or 3 were entirely satisfactory, so architect No. 4 was commissioned to start on plan No. 4. Architect No. 3 sued and, of course, received a substantial sum from the city.

Nine years seem a long time ago, especially with such a kaleidoscopic background of borough officials, architects and plans, and the writer does not recall just why architect No. 4 did not rush in and make sure of the job before

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it could be taken away from him. Probably lack of funds, owing to the depletion of the appropriation through the inroads made upon it by the successful suits of architects Nos. 1, 2 and 3, may have had something to do with it. At any rate nothing has yet been done towards the erection of the building except the tearing down of the old municipal building in 1914 so that architect and builder might get a good running start and No 5, if appointed, could not overtake them. Meanwhile the city is renting offices in private buildings for the departments and bureaus which were turned out of the old municipal building.

You may ask what happened in 1914 and 1918 when architects Nos. 5 and 6 were due to appear upon the scene. In 1914 the new head of the borough government was re-elected to succeed himself and the incentive to a change in architect and plan appeared to be lacking. Then came the war with the general cessation of building operations. These conditions continued through the first year of the entirely new administration, which came into office in 1918, and it is possible that the whole plan has been forgotten. At any rate the city is still renting office space in neighboring private buildings, the owners of which are doubtless willing to let this sleeping dog lie. It is quite unnecessary for the writer to attempt to point a moral from this simple recital of facts.

I cannot stop without a plea for a policy different from that commonly followed with respect to the location of some subordinate or secondary public buildings, a plea which I have made before and will venture to repeat.

There are many such minor public buildings—far greater in number than those likely to be grouped in a civic center—which are commonly located in a haphazard fashion wherever the most available or the cheapest property can be acquired for them at the time they are erected. These buildings are of two classes, to which different kinds of location are best suited. In one class

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are schools of various grades, branch libraries, public baths, etc., which need not be and should not be on main traffic streets. Their location will depend to a large degree upon the distribution of population, but if certain blocks in different parts of the city were set aside for them, several could be grouped together and designed in harmony with one another with sufficient space about them to insure abundant light and air and with room for future additions, space for which, until needed, might well be devoted to playgrounds. Such a block would be peculiarly well suited to the purpose if the street system about it were such as not to invite traffic.

The other class would include such buildings as police stations, fire engine houses, repair shops, municipal garages or stables, and buildings of this character. These also could be designed to harmonize with one another and form consistent groups. They would naturally be located on or in close proximity to the more important thoroughfares in order that the territory which they serve might be easily reached. In either case such municipal blocks would be creditable to the city, while the problem of heating, maintaining and caring for them would be greatly simplified.

When asked to prepare a paper on the Common Sense of Civic Centers, it was assumed that it would serve as an introduction to papers and discussions which are to follow and which may have more constructive value and be of greater local interest. Perhaps what has been written has illustrated the nonsense rather than the common sense of efforts to create civic centers in the city from which the illustrations have been taken. In this case it is to be hoped that some cities will prove to have the faculty of learning from the mistakes of others and not be obliged to suffer from similar blunders of their own.

In conclusion let me present a few fundamental principles which should be controlling in any study of the civic center problem:

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The centralization of all city business in one locality, while it may result in economy and convenience in the case of a small city, may prove costly and inconvenient in a large city.

Civic centers should be planned so that only related public business and activities need be concentrated in them, subordinate or secondary centers being established when overcentralization becomes apparent.

Secondary centers should be so located as to be easily accessible through direct traffic routes from the principal center and from each other and readily found by those desiring to reach them.

The possible need of principal and secondary centers should be kept in mind when developing the plan of any city and its successive additions so that a rearrangement of the streets about or leading from them may not be necessary.

It should be assumed that the buildings comprising the civic group or groups will be worth seeing and the chief buildings should, therefore, be on the axis of one or more of the streets leading to them.

Some competent and continuing authority should be required to approve plans for all civic centers and designs for all public buildings or other structures located in or about them and such plans, once approved, should not be changed without the concurrence and approval of the same authority.

ORGANIZATION OF THE NATIONAL CONFERENCE ON CITY PLANNING

At the business meeting of the Eleventh Conference held in Buffalo on May 28, 1919, the following resolution was passed:—

Resolved: That an organization be recreated to be known as the National Conference on City Planning. The officers and Board of Directors for the first year shall be the officers and Board of Governors of the American City Planning Institute. All present members of the City Planning Institute shall be members of the National Conference on City Planning.

The following constitution was adopted:

ARTICLE 1. The name of the organization shall be the National Conference on City Planning.

ARTICLE 2. The object of this organization shall be to promote the cause of city, town and regional planning.

ARTICLE 3. The officers shall be a President, Vice President, Secretary and Treasurer. There shall be a Board of Directors of 21 persons, seven of whom shall be elected annually for a term of three years.

OFFICERS AND BOARD OF DIRECTORS

President, Nelson P. Lewis, Municipal Building, New York City.

Vice President, Lawson Purdy, 105 E. 22nd St., New York City.

Secretary and Treasurer, Flavel Shurtleff, 60 State St., Boston, Mass.

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